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Soil Survey
of
Fayette County, Kentucky

By

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United States Department of Agriculture, in Charge

and

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Bureau of Chemistry and Soils

In cooperation with the
Kentucky Agricultural Experiment Station

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SOIL SURVEY OF FAYETTE COUNTY, KENTUCKY

By HOWARD WM. HIGBEE, United States Department of Agriculture, in Charge, and K. S. VENABLE, Kentucky Agricultural Experiment Station

INTRODUCTION

Fayette County, with an area of 283 square miles, lies near the eastern edge of the "inner bluegrass region" of Kentucky. Lexington, the county seat, is situated near the geographic center of the county.

Physiographically, the county is a part of a broad smooth or undulating well-drained upland plain. The larger streams flow through deep narrow valleys or gorges that have been cut from 200 to 400 feet below the adjacent uplands.

The mean annual precipitation is 43.45 inches, the mean annual temperature is 55° F., and the average frost-free season covers a period of 188 days.

The pioneer settlers found the land included in this county a wilderness of tall sedges and grasses, canebrakes, and oak-hickory-beech forests, but now 95 percent of the county is included in beautiful farms made up of Kentucky bluegrass pastures and fields of corn, clover, and tobacco. Light horses, dairy cattle, beef cattle, and sheep are the principal livestock raised. The soil and climatic conditions are especially favorable to the growth of Kentucky bluegrass, which remains green throughout the winter and provides nutritious feed for livestock.

Fayette County is probably the most highly developed agricultural county in Kentucky. The agricultural products for 1929 were valued at $6,442,854. Tobacco, bluegrass seed, dairy products, beef cattle, lambs, and wool are important commodities sold from the farms. In addition the annual sales of thoroughbred horses will run well into hundreds of thousands of dollars a year. One of the largest loose-leaf tobacco markets in the country is located at Lexington, providing a nearby market for the tobacco grown in the surrounding area. Approximately 92,873,045 pounds of Kentucky's 1931 loose-leaf burley tobacco crop was sold through this market.[1]

Most of the farms are equipped with elaborate and expensive farm buildings and fences, that are considered essential for the types of agriculture carried on. Land (including buildings) values in 1930 averaged $263.02 an acre, although the value of some farms exceeds $1,000 an acre.

Fayette County includes parts of three distinct soil divisions of central Kentucky. These divisions are locally designated as the "inner bluegrass region", which is an area of deep fertile reddish-brown high-phosphate soils; the "hills", which is an area of hilly

[1] Statement of Lexington Tobacco Warehouse Association, Lexington, Ky., as printed in the Lexington Herald, Feb. 25, 1932.

land consisting of dark alkaline high-potassium soils; and the "white oak land", which is an area of leached brown, grayish-brown, and yellowish-brown soils that have heavy plastic clay subsoils. All three of these soil divisions lie in the southern part of the region occupied by the Gray-Brown Podzolic group of soils. All the soils in the county have been subjected to leaching, but only the soils of the white oak land show evidence of strong podzolization.

The reddish-brown soils of the inner bluegrass region, classified as the Maury and Hagerstown soils, are without question the most fertile and most productive upland soils in the county. They have loose mellow rich-brown or reddish-brown surface soils that are easily cultivated under a wide range of moisture conditions, and well-drained and well-aerated brownish-red or deep mahogany-red silty clay subsoils that have been developed from limestone materials. These soils are easily penetrated by plant roots, and soil water moves readily through them to supply the water requirements of growing plants. The Maury soils are the most fertile, because they are developed from limestone soil materials that contain a very high percentage of phosphorus. The agricultural use of these soils is limited mainly by climatic environment or the degree of slope of the land. The important crops grown on these soils are corn, wheat, clover, tobacco, and Kentucky bluegrass. Acre yields of tobacco range from 800 to 1,600 pounds of loose leaf, corn from 25 to 50 bushels, and clover from 1½ to 2 tons of hay.

The dark-colored soils of the hills are developed on the slopes of a narrow band of hills that encircle the inner bluegrass region. These soils have been classified as Eden, Fairmount, Culleoka, Muskingum, and Salvisa soils. They occur only in small areas, and they are not everywhere typical of these soils as normally developed in other counties. They occupy rather steep slopes and are subject to considerable erosion when cultivated, and for this reason they are better adapted to grasses and hay crops, although high yields of corn, wheat, and tobacco are produced on selected areas during years of normal rainfall. Crop yields on these soils are reduced to a considerable extent if the rainfall is below normal during the growing season. The Eden soils are dark-drab coarse-granular silty clays that are basic or only slightly acid and high in potassium. They are important in the production of alfalfa hay and bluegrass pasture, the latter being especially good for the raising and fattening of sheep. Next in importance are the Culleoka and Muskingum soils which are developed on very steep slopes and are subject to considerable erosion when cultivated. They are best suited to hay and grass crops but also produce good yields of a very high quality burley tobacco. The Fairmount and Salvisa soils comprise a very small total area and are largely devoted to bluegrass pasture.

The white oak land, or "beech-ridge" land, includes a group of brown, grayish-brown, and yellowish-brown soils that have silt loam surface soils and semiplastic to very plastic yellow clay subsoils splotched with rust brown and gray. These soils were originally covered with a dense white oak, hickory, and beech forest. They have been developed on a land surface with a smooth or rolling surface relief that provides good surface drainage. In general, these

soils have been leached until they are now acid to a depth within a few inches of the underlying limestones and shales, and for this reason they are less fertile than the soils of the other groups. Even though much of the lime has been leached from these soils, they produce comparatively good yields of corn, wheat, tobacco, and redtop or timothy hay, but the use of lime and fertilizer is essential if maximum crop yields are to be obtained. The Loradale and Mercer soils are the important soils of this group. The Loradale are the better soils, because they are less leached, have brown surface soils, and their subsoils are less plastic and more easily penetrated by soil water and plant roots. The Mercer soils have grayish-brown or yellowish-brown strongly acid surface soils and rust-brown and gray, splotched brownish yellow, plastic clay subsoils that are not easily penetrated by plant roots or soil water. During wet seasons these soils become thoroughly saturated, temporarily preventing soil aeration and creating undesirable conditions for plants that require a well-drained soil.

The Huntington and Elk soils are developed on the first bottoms and terraces. Their total area is small, but they are very fertile and productive and are especially well adapted to the production of corn and tobacco. Corn yields on these soils range from 40 to 90 bushels of shelled corn an acre.

COUNTY SURVEYED

Fayette County occupies an irregular-shaped area of 283 square miles, or 181,120 acres, near the central part of Kentucky (fig. 1) and near the eastern edge of the inner bluegrass region. The county has a maximum north-south length of 26 miles and a maximum east-west width of 20 miles. Lexington, the county seat, situated near the geographic center of the county, is the third largest city in the State, and in 1930 had a population of 45,736.

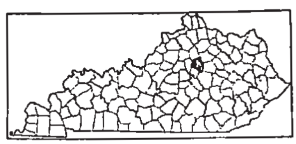

FIGURE 1.—Sketch map showing location of Fayette County, Ky.

The county, in general, consists of a broad undulating plain which has no prominent knobs or ranges of hills that protrude into the sky line, such as may be seen in nearby Madison, Boyle, and Garrard Counties. Even though the surface relief within Fayette County shows some variation, as a whole it may be considered as an old base-level plain which has been uplifted and is now being dissected by the present land-erosion cycle operating throughout central Kentucky. The surface relief ranges from gently rolling to undulating and is typical of the inner bluegrass region. The varied relief is largely the result of erosion which has taken place since the late geological uplift of central Kentucky. The point of maximum uplift terminated in what is known as the Jessamine Dome in Jessamine County which adjoins Fayette County on the south. This uplift created two major and several minor fault lines that traverse the eastern half of Fayette County in a northeast-southwest direction.

The erosion cycle has developed rather deeply cut drainage channels through V-shaped valleys. The western two-thirds of the county is occupied by many rather wide V-shaped valleys and gently slop-

ing rounded ridges, and the southeastern part is severely dissected by numerous and deep V-shaped valleys lying between sharp narrow hills or ridges. Where these valleys enter the Kentucky River gorge they become rugged, steep, or even precipitous, and stony. Kentucky River flows in a gorgelike valley with narrow flood plains between the river channel and the valley walls which are mainly limestone cliffs or very steep hills. In places where the river has cut through the massive limestone formations, it is bordered by high, precipitous, picturesque cliffs that range from 150 to 250 feet in height.

Drainage is well developed, and there are practically no poorly drained areas. The largest stream, Kentucky River, flows along the southeastern side of the county and forms the boundary line between Fayette and Madison Counties. The next largest stream, North Elkhorn Creek, together with its tributaries, drains the northeastern third; and the third largest stream, South Elkhorn Creek, together with Town Branch, drains the western third. Boone Creek, which forms part of the eastern boundary, together with several small branches, all of which flow into Kentucky River, forms the drainage system of the southeastern part.

The geological materials underlying the soils differ considerably without change in topographic elevations, owing to the various geological fault lines that traverse the area. Practically all the western half is underlain by rather massive gray limestones which are considered rather high in phosphorus. The eastern part is underlain by various geological materials, the most important of which are the Cynthiana limestones. Along the major fault lines, especially those southeast of Lexington, are small irregular areas of Eden shales. These shales are also present in the southeastern part along Kentucky River, where another major fault line cuts across several of the meander loops of the river. In those parts where the Eden shales occur the degree of dissection is much greater than in areas underlain by the more massive limestones which are more resistant to weathering and erosion.

Elevations range from about 810 feet, where South Elkhorn Creek leaves the county northwest of Lexington, to a maximum of about 1,065 feet, about 2½ miles southeast of Lexington along the Chesapeake & Ohio Railway. The general elevation of the uplands ranges from 900 to 950 feet above sea level, and the elevation of the Kentucky River flood plain ranges from about 525 to 575 feet. Elevations[2] of some of the more important places are as follows: Lexington courthouse 955 feet, Lexington at junction of Maxville and North Main Streets 980 feet, Greendale 944 feet, Donerail 880 feet, Elk Chester 803 feet, and Chilesburg 1,051 feet.

The State of Kentucky lies within the oak and southern hardwood forest region of the United States.[3] The original forest of Fayette County, which probably was of a semiopen type, consisted of such trees as white oak, mossycup (bur) oak, chinquapin oak, wild cherry, hackberry, white ash, hickory, beech, black walnut, sugar maple, cottonwood, yellowwood, poplar, sycamore, cedar, lo-

[2] GANNETT, A. A DICTIONARY OF ALTITUDES IN THE UNITED STATES. U. S. Geol. Survey Bull. 274, ed. 4, 1072 pp. 1906.
[3] SHANTZ, H. L., and ZON, R. ATLAS OF AMERICAN AGRICULTURE, PART 1. THE PHYSICAL BASIS OF AGRICULTURE, SEC. E, NATURAL VEGETATION. U. S. Dept. Agr. Advance Sheets, 6329 pp., illus. 1924.

cust, willow, and others of less importance. Oak, hickory, beech, ash, and black walnut were considered the dominant tree growth. The undergrowth was mostly small brush, vines, and briers, the more important of these being cane, sassafras, papaw, blackhaw, sumac, wild honeysuckle, trumpetvine, redbud, dogwood, spicewood, wild blackberries, and other brambles. Practically all of the original forest has been cut and used as lumber in buildings, and for fence rails, posts, and fuel. A few areas are sparsely wooded with white oak, ash, and chinquapin oak, which are characteristic of the inner bluegrass region of central Kentucky.

The original grass cover was probably chiefly broomsedge and similar grasses. The early settlers reported that the scattered areas of grassland furnished grazing areas for herds of wild elk, buffalo, and deer. There are now no virgin areas of the original grasses, as heavy grazing and the encroachment of Kentucky bluegrass have practically destroyed the native grasses. In some parts of the county, however, some broomsedge grows in the fields or pastures that have not been plowed for several years. This grass is now considered more or less of a weed pest.

Kentucky bluegrass, now the dominant pasture and lawn grass of the inner bluegrass region, is unusually well adapted to the soils of this county. The success of bluegrass, which was introduced into the United States from the Old World, was responsible for central Kentucky being called the "bluegrass region." From Kentucky, bluegrass seed was sent to other frontier States and became known as "Kentucky bluegrass." It is now grown in preference to all other grasses in all parts of Fayette County. It affords excellent pasture and is also used as a sod grass for lawns and golf courses. It is an excellent seed producer and yields from 8 to 12 bushels of stripped seed an acre.

Some of the more important weeds or grasses considered detrimental to crops or bluegrass pastures are cocklebur, burdock, Spanish-needle, plantain, mullein, horseweed, larkspur, thistle, ironweed, ragweed, wild buckwheat, cheat, nettle, wild oatgrass, and foxtail grass.

The early wild animal life included elk, buffalo, deer, panther, raccoon, wildcat, bear, fox, opossum, skunk, groundhog, rabbit, fox squirrel, gray squirrel, ground squirrel, flying squirrel, mink, muskrat, weasel, and various kinds of rats and mice. Today practically all the wild animals have been killed or driven out, except a few foxes in the hills of the eastern part of the county, squirrels which have been given protection on larger farms, and a few rabbits, raccoons, skunks, and groundhogs.

At one time wild turkeys, ducks, geese, pheasants, quail, and doves abounded. The more important present-day bird life includes the mockingbird, bluejay, redbird, blackbird, swallow, martin, owl, crow, robin, thrush, sparrow, buzzard, bluebird, woodpecker, and a small number of doves.

Most of the streams are too small and shallow for the propagation of fish, and for this reason practically no game or food fish are found in the streams, except Kentucky River, the only stream in which fishing may be considered a worthwhile sport. Such fish as suckers, crappies (locally known as newlights), white perch, catfish,

and similar fish may be caught in this stream. Fishing clubs have stocked the water reservoirs of the Lexington Water Co. and in this manner have provided some fishing near Lexington.

Clean cultural practices and weed control, especially in cultivated fields, along fence rows, and in pastures, are no doubt responsible for the small number of insect pests. The tobacco worm, Mexican bean beetle, cutworm, Colorado potato beetle, and wireworm seem to be the insects most destructive to farm crops. Grasshoppers occasionally become numerous during exceedingly dry years but are seldom destructive to crops.

As early as 1775, white people began to settle in the country now included in Fayette County. During the year 1775, William McConnel and a party of men visited the present site of Lexington and built a log cabin as partial fulfillment for title to the surrounding land, but for some reason these men did not remain to establish permanent rights to their claim. The first permanent settlement was made during April 1779, when Col. Robert Patterson and 25 men from Harrodsburg established a settlement at the present site of Lexington. In September of that year, several families led by Col. John Grant from North Carolina and Capt. Richard Ellis from Virginia made a settlement at Grant Station (5 miles from Bryan Station), but on account of trouble with the Indians this settlement was abandoned the following year. At the close of the Revolutionary War several of these families, including the Grant and Ellis families, returned to the original settlement and a prosperous community sprang up. In November 1779, Bryan Station was settled by people mostly from North Carolina, among whom were four Bryan brothers—Morgan, James, William, and Joseph—for whom the station was named. It is of interest to know that William was a brother-in-law of that famous frontiersman and soldier, Daniel Boone. Boone Station (in Jessamine County), located about 20 miles southeast of Lexington, was settled by Daniel Boone in 1783. Most of the early settlers came from Virginia. Many of these families were broken up or killed by the warlike Indians who lurked in the frontier wilderness, and sickness and exposure also took their toll of life.

The area now included in Fayette County once lay in the territory of Virginia. In December 1776, the county of Kentucky became a part of Virginia. In 1780, Kentucky was divided into three counties, Jefferson, Lincoln, and Fayette. Fayette County received its name in honor of the French general, LaFayette. Later other counties were formed from Fayette, and in 1798 Fayette County reached its present size. In 1800 the population of the county had reached a total of 14,028.

One of the first railroads built in the United States was the old Lexington & Ohio, which extended from Lexington to Frankfort, between the years 1831 and 1835.

Transylvania University, one of the first educational institutions established west of the Allegheny Mountains, was chartered in 1780 and after a few years' existence was permanently located at Lexington.

Horse racing, which was introduced by the early settlers from Virginia, has been a popular sport in the county ever since the early days. One of the first jockey clubs was organized in this county in

1797. In about 1900, wealthy men and women from various parts of the United States became interested in Fayette County land as a place to locate estates and stock farms where thoroughbred race horses are raised, and since that time the number of such farms has gradually increased.

In 1880 Lexington was the location of many manufacturing plants and other industries, but the opening of steam navigation on Ohio River caused a decline in the industrial development of this city and the growth of such development in Cincinnati and Louisville. Ashland, now a part of the city of Lexington, was the home of Henry Clay, and this home is still preserved in honor of Clay's services to the Nation.

The population of the county has been constantly increasing since 1880, according to the United States census data. The total population in 1930 was 68,543. Lexington, the county seat, had a population of 45,736 in 1930. Of this number, 12,759 were colored and 612 foreign-born white. The next largest town is Athens, with a population of 206 in 1930, located about 10 miles southeast of Lexington. Other villages and trading centers are Chilesburg, Brighton, Spears, East Hickman, South Elkhorn, Shannondale, Fort Spring, Elk Chester, Yarnallton, Bracktown, Hillenmeyer, Greendale, Donerail, Muir, Montrose, and Avon.

The county is exceptionally well supplied with railroad and bus transportation facilities. From Lexington paved or macadam highways radiate in all directions. This city is served by the Cincinnati, New Orleans & Texas Pacific Railway, the Louisville & Nashville Railroad, the Chesapeake & Ohio Railway, and the Southern Railway. All the main roads are either macadamized or paved, and many of the farm drives and roads are macadamized. Motor trucks are a very important means of transporting freight from Lexington to and from neighboring towns, and this form of transportation has been made possible through the building of a network of all-weather hard-surfaced roads throughout central Kentucky.

Nearly every rural home has a telephone, and many have radios. Public schools are located at convenient intervals, and many children are transported to and from school by motor busses. University of Kentucky, Transylvania University, and smaller colleges and schools at Lexington provide facilities for advanced education sufficiently close to home that the pupils may attend college during the day and be at home at night. Nearly every rural community supports a well-kept and well-attended church and Sunday school.

CLIMATE

Climatic conditions throughout the county are very uniform and are of the humid temperate continental type, marked rarely by hot dry years, such as 1930, when the summer temperature rose to 102° F. The difference between the mean temperatures of summer and winter is 39.5°, and the difference between the highest and lowest temperature recorded is 122°. The mean annual precipitation, as recorded at the United States Weather Bureau station at Lexington, is 43.45 inches, about one-half of which falls between March 1 and September 1.

The normal weather conditions are rather favorable to present agricultural practices. Occasional dry hot periods during July and August reduce the yields of corn, but too much rain and cloudy weather during this period are not favorable to the production of good-quality tobacco. The winters are short, and the intermittent warm periods during this season stimulate the growth of bluegrass, wheat, and rye sufficiently to produce considerable winter pasture for livestock. A few farmers produce two crops of potatoes on the same field in one season.

Central Kentucky has an abundance of bright sunshiny weather throughout the year, which insures a healthful climate. The average length of the frost-free season at Lexington is 188 days, from April 18 to October 23. Frost has been recorded at this station as late as May 20 and as early as September 26.

Table 1 gives the more important climatic data for Fayette County, as recorded by the United States Weather Bureau station at Lexington.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Lexington, Fayette County, Ky.*

[Elevation, 989 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1930)	Total amount for the wettest year (1882)	Snow, average depth
	°F.	*°F.*	*°F.*	*Inches*	*Inches*	*Inches*	*Inches*
December	35.8	71	−9	3.77	1.79	1.23	4.5
January	32.9	72	−14	4.18	4.44	7.34	6.6
February	35.4	75	−20	3.62	2.91	7.48	4.9
Winter	34.7	75	−20	11.57	9.14	16.05	16.0
March	43.7	85	−1	4.32	2.54	5.18	3.5
April	54.3	88	15	3.50	.81	1.60	.6
May	64.3	93	30	3.91	3.35	11.03	.2
Spring	54.1	93	−1	11.73	6.70	17.81	4.3
June	72.2	99	40	4.05	1.89	10.44	.0
July	75.9	102	51	3.65	.45	4.67	.0
August	74.5	100	46	3.45	1.69	5.94	.0
Summer	74.2	102	40	11.15	4.03	21.05	.0
September	68.5	98	32	3.07	2.80	4.12	.0
October	57.4	89	21	2.59	.63	1.93	(1)
November	44.8	78	2	3.34	1.59	2.37	1.1
Fall	56.9	98	2	9.00	5.02	8.42	1.1
Year	55.0	102	−20	43.45	24.89	63.33	21.4

[1] Trace.

AGRICULTURAL HISTORY AND STATISTICS

The fertile soils of central Kentucky attracted settlers from Virginia, North Carolina, and other Atlantic Coast States as early as 1775, but the first permanent settlements were made between 1780 and 1790. At first, agriculture was little more than self-sustaining,

and the early settlers grew only those crops needed to supply the family with food and feed for their livestock. Later livestock and grain became important cash products. The livestock were driven overland to markets in Georgia, and the farm products were rafted down the Ohio and Mississippi Rivers to New Orleans. The important crops grown previous to 1880 were corn, wheat, oats, rye, potatoes, a small quantity of tobacco, and hay. The chief livestock and livestock products were cattle, sheep, lambs, hogs, wool, butter, cheese, and poultry. Few important changes have occurred in the general agricultural practices within the last 50 years. There are no large industrial developments.

Nearly 98 percent of the county is in farms. The 1930 Federal census reported 1,704 farms, with an average size of 97.8 acres and an average value of $25,734 (including land and buildings), or approximately $265 an acre. The average size of farms gradually decreased from 143 acres in 1880 to 77 acres in 1925, but has increased since that time. The larger farms are in the northern and western parts of the county. Approximately 93 percent of the land occupied by farms, or an average of about 90.4 acres a farm, may be considered improved farm land, which includes crop land and plowable pasture.

Farm-land values differ considerably in different parts of the county. In the more level areas in the northern and western parts they are from 3 to 5 times those in the more hilly section in the southeastern part.

Agriculture is the important and fundamental enterprise. Tobacco and bluegrass seed are the leading cash crops, and corn and wheat are very important.

The breeding, raising, and training of race horses is without question the leading livestock enterprise. This has developed into a highly specialized business that involves large sums of money. Figures on the number and value of race horses in this county are not available, but it is a well-known fact that the values run into millions of dollars. A large proportion of the fastest race horses in the United States have been bred and raised in this county. In connection with this enterprise, large sums of money have been expended for the construction of barns, training tracks, fencing, and other equipment. The breeding and raising of thoroughbred race horses is centered north of Lexington, and the entire northwestern half of the county is largely devoted to the production of thoroughbreds.

Comparatively few large draft horses are used on the farms, but some heavy draft mules are used on the larger farms. Most of the horses and mules are of medium size and are of a dual-purpose class of animals which may be used for farm work, driving, or riding.

Dairy cows, especially high-grade Jerseys, are the chief type of cattle on the average farm. The number of cows on a farm differs considerably, as some of the larger dairies have from 25 to 30 or more cows, and the smaller dairies from 5 to 15. Most farmers keep from 3 to 5 cows to supply dairy products for the home, and any excess is sold. Most of the larger dairies sell bottled milk direct to city consumers, and the smaller dairies sell the whole milk to Lexington milk companies which pasteurize it and then retail it to the city consumers.

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The results of bovine tuberculosis surveys made by the Bureau of Animal Industry in the bluegrass region show that less than 1 percent of the cattle in this county reacted to the tuberculin test.

Fewer beef cattle than dairy cattle are raised, but on a few farms in the southeastern part of the county, chiefly in the rougher areas along Kentucky River and Boone Creek, beef cattle are grazed on the bluegrass pastures in late summer or fall and then fed for market in the winter. Some cattle feeding is practiced during the summer, but, as a whole, this practice is rather limited. The main beef breeds are Aberdeen Angus and Shorthorn.

Sheep raising is important, especially in the rougher and more hilly sections in the southeastern part. Most farmers raise a few hogs, but very few have more than 10 or 15.

Two one-day-a-week livestock markets and stockyards are located at Lexington. All classes of livestock are bought and sold at this market by buyers from the large packing companies and others. A small local packing plant slaughters meat animals and supplies a part of the meat for the city of Lexington.

Corn, wheat, oats, rye, and barley have always been important crops, and the yields and acreages of these crops have remained fairly constant since 1880. In 1929, however, the acreages devoted to both corn and wheat were reduced appreciably. This was probably due to the low yields brought about by a period of dry years, together with prevailing low prices.

Most of the corn is cut by hand and shocked in late summer or early fall, and as soon as the corn is cut the fields are sown to wheat or rye. When the grain is dry it is husked, and the stover is reshocked and used as feed for livestock during the winter. Practically all the grain is used as feed for livestock in the vicinity where it is grown, although a small part of the crop is marketed or ground into meal and sold.

Wheat usually follows corn in the rotation. The principal reason for growing wheat is that it fits into the general scheme of crop rotation and is valuable as a nurse crop in seeding grasses. Wheat retards soil erosion during the winter and provides winter pasture for livestock. Most of the wheat straw is baled and sold to the many race-horse stables. The normal wheat acreage is about 20,000 acres, and the normal yield averages 18 bushels an acre.

The decrease in the corn and wheat acreage has been accompanied by an increase in the acreage of hay crops. Good-quality hay is in great demand, owing to the large quantity consumed on the stock and dairy farms surrounding Lexington.

Rye is another important crop which is grown throughout the county, chiefly for winter pasture and for straw, the yield of which is generally greater than that of wheat straw on the same soil. Barley frequently follows tobacco in the rotation. It is cut and threshed and used mainly for feed. Hemp was introduced about 1775 and became a rather important crop between 1880 and 1890, but in 1931 only one farm was producing hemp. This crop was grown both for the seed and the fiber.

The main cash and credit crop is burley tobacco, and in 1929, 11,000,771 pounds of tobacco were produced. Under the prevailing climatic conditions a very good grade of tobacco is grown, and the average acre yield is about 1,000 pounds. During unusually favor-

able years acre yields ranging from 1,500 to 2,000 pounds are produced on the well-managed and most fertile soils; but during dry seasons the yields may be reduced to as little as 500 pounds. Tobacco stalks are valuable as fertilizer and, in good farm practice, are spread on the land.

A number of large tobacco warehouses are located at the northwestern edge of the city of Lexington. They are used for the marketing, processing, and storing, or aging, of tobacco. A large proportion of the light loose-leaf burley tobacco of central Kentucky is sold at auction in Lexington, and this market is said to be the largest loose-leaf tobacco market in the world. The sales reports for the season of 1931–32 show that 92,873,045 pounds of loose-leaf burley tobacco were sold on the floors of the Lexington tobacco market during that season. The buyers of tobacco remove the loose-leaf tobacco from the sales floors to the processing plants where the tobacco is dried, humified to the proper moisture content, and then pressed into hogsheads containing from 700 to 1,000 pounds. The hogsheads are placed in storage for several years, during which time the tobacco ages and mellows preparatory to its final processing into cigarette and pipe tobacco.

Burley loose-leaf tobacco was discovered in Brown County, Ohio, in 1864. When first grown in Fayette County, about 1875, it was marketed in hogsheads at Louisville and Cincinnati. This continued until about 1906, when the present loose-leaf tobacco-marketing system began at Lexington. Only about 700 pounds of tobacco were grown in the county in 1879, but 10 years later production had increased to more than 2,500,000 pounds, and by 1919 to 17,000,000 pounds.

Among the grass crops, Kentucky bluegrass dominates. This grass was brought from Virginia to Kentucky by the early settlers. It was especially well adapted to the soils of central Kentucky and, being a good seed producer, it was not long before it became established as one of the permanent grasses of this part of the State. It withstands rather hard grazing and is not trampled out nor frozen out during the winter. This grass is now used both as a pasture grass and a seed producer. The 1930 census reports grass seed, most of which was bluegrass seed, grown on 6,831 acres and yielding 48,199 bushels in 1929. When bluegrass is used to produce a seed crop it is not grazed by livestock until the seed crop has been harvested. The seed is harvested by mechanical strippers. The most modern type, the rotary stripper, has 3 or 4 stripping blades set on a revolving cylinder, and when it is drawn over the grass, it strips the seed and deposits it on an elevator that empties it into large sacks hung from the upper end. Two horses are used to draw the strippers, and each stripper strips a swath about 6 or 7 feet wide. Bluegrass seed probably ranks next to tobacco as a cash crop. Kentucky bluegrass is also used as a sod and lawn grass throughout the city of Lexington and on all golf links.

Clover and clover and timothy mixed are the leading hay crops. Clover and timothy mixed are grown because they make very desirable hay for horses and dairy cows. The acreage of these two hay crops has practically doubled in the last 10 years, owing in part to the increasing demand for hay. For general livestock feeding other than horses, clover and alfalfa hay are preferred, and soy-

bean hay has recently been used rather extensively as feed for dairy cows. For this reason the acreage of legumes cut for hay has increased considerably in the last 10 years.

Alfalfa was introduced into the county about 1895. This important legume-hay crop has not increased in acreage or become a very important source of hay, chiefly because the alfalfa plant is not naturally adapted to the soils. Some farmers have limed their soils before sowing alfalfa and in this way have been able to obtain fair yields of hay. The alternate freezing and thawing of the soils in winter causes heavy losses in alfalfa stands, owing to winter-killing, by breaking the alfalfa roots by heaving of the soil on freezing. The 1930 census reports 737 acres devoted to alfalfa in 1929, with a yield of 1,438 tons.

The commercial production of orchard fruits and berries is of little importance. Most of the orchards contain only a few trees for a home supply of fruit, and many of the trees are diseased and poorly cared for. Late spring frosts frequently destroy the fruit crop at blossoming time. Strawberries are produced chiefly for local use, and most of the blackberries are picked from vines that grow wild in pastures or along ravines. Truck-crop and vegetable farming is carried on to some extent near Lexington, where the products are sold to supply the demands of this city for fresh vegetables. The chief vegetables grown are tomatoes, beans, sweet corn, beets, carrots, cucumbers, cabbage, and cantaloups.

Table 2, compiled from the Federal census reports for 1880 to 1930, inclusive, gives the acreage devoted to the principal crops in Fayette County in stated years. These data show the general trend of agriculture during the last 50 years.

TABLE 2.—*Acreage of principal crops in Fayette County, Ky., in stated years*

Crop	1879	1889	1899	1909	1919	1929
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Corn	28,839	23,876	28,511	28,480	25,386	11,577
Oats	3,659	5,501	1,500	1,324	1,056	484
Wheat	21,402	18,652	27,002	19,041	20,074	5,056
Rye	1,045	713	383	503	387	1,034
Barley	4,231	1,636	45	675	681	386
Potatoes		773	800	1,230	297	625
Tobacco	2	2,169	5,137	5,690	15,677	11,294
Hay	5,947	16,801	15,111	12,021	8,269	11,751

Table 3 gives the value of all agricultural products by classes in 1919 and 1929 as reported by the Federal census.

TABLE 3.—*Value of all agricultural products in Fayette County, Ky., in 1919 and 1929*

Crop	1919	1929	Livestock and products	1919	1929
Cereals	$2,450,606	$495,635	Value of all domestic animals	$4,274,541	$1,980,563
Other grains and seeds	51,798	63,535	Dairy products, excluding home use	376,395	541,560
Hay and forage	383,327	264,918	Poultry and eggs	237,062	280,652
Vegetables	295,597	254,274	Wool, mohair, and goat hair	31,858	48,528
Fruits and nuts	9,058	31,744			
All other crops (principally tobacco)	4,007,100	2,481,445	Total	4,919,856	2,851,303
Total	7,198,386	3,591,551	Total agricultural products	12,118,242	6,442,854

The sources of water supply for livestock are springs, wells, streams, and ponds. During droughty periods the ponds, streams, and even some wells become rather low or dry. The pond water supply could be improved by increasing the size of the ponds on many farms, as most of them are too small and become stagnant or green with algae during the summer. Some of the larger farms have deep drilled wells to supply water for both livestock and domestic use. Some of these wells are as much as 600 feet deep. The city of Lexington depends for its water supply on several water reservoirs that have been constructed in valleys southeast of the city. During very dry seasons it is necessary to pump water from Kentucky River to Lexington through a recently constructed pipe line.

The use of fertilizers for certain crops began prior to 1880. Even though only 10.9 percent of the farmers used fertilizer in 1929, the total amount used has increased considerably in the last 20 years. Most of the fertilizer is applied to the tobacco land. The soils are probably more in need of nitrogen than of any other fertilizer element.

More than 60 percent of the farms reported an expenditure for labor in 1929. The total amount spent was $1,217,418, or an average of $1,149.59 a farm reporting. The larger proportion of the expense for labor is probably paid out on the stock farms, where a large amount of labor is necessary in caring for the horses. On farms where general farming or dairying is carried on, most of the labor is performed by the farmer and his family. The quality of labor, both white and colored, is very good. Practically all the laborers are native to the county. A large proportion of the farm work is performed by hand labor, and such crops as tobacco and corn are cut by hand.

Slightly more than one-half of the general farms are operated by owners. As a rule, the smaller farms are operated by the owners and most of the larger farms by tenants. Most of the tenant farms are leased or operated on the crop-share basis, whereby the landowner furnishes the land, buildings, and fertilizer, and the tenant pays operating expenses and furnishes tillage equipment. Managers operate less than 3 percent of the farms.

Most of the farms are equipped with substantial farm buildings, which are kept in good repair and well painted. Many of the farm homes are typical southern colonial mansions with broad verandas fronted with high-columned porches. Most of the houses are surrounded by large trees and broad spacious lawns. Practically all the barns on the stock farms are well-constructed, well-painted buildings which are supplied with running water and electric lights. A large proportion of the farms are furnished with electric light and power by high-tension lines.

Practically every farm is enclosed by a well-built fence of stone, painted boards and panels, or woven wire, and will hold any class of livestock. Several of the better stone fences are laid up in mortar. The wire fences range from 3 to 6 feet in height and are well supported with strong posts and from 2 to 3 stays between each set of posts. Practically all the fence rows are kept weed-free and well sodded to bluegrass, which adds to the neat appearance of the farms in this section.

The machinery on the average farm consists of a walking plow, a peg-tooth harrow, 1 or 2 single- or double-shovel cultivators, a hand corn planter, a wheat drill, a wagon, a mowing machine, a hay-rake, a bluegrass stripper, hoes, rakes, scythes, and other implements and hand tools. On the larger and more up-to-date farms in the more level parts of the county, such implements as riding plows, riding cultivators, wheat binders, wheat drills, tobacco setters, rotary bluegrass strippers, disk harrows, and similar machinery are used. A few farm tractors are used in tillage operations.

SOILS AND CROPS

Fayette County occupies parts of three distinct soil and agricultural divisions of central Kentucky. Each of these divisions is distinct in the natural fertility of its soil or in its physiographic character. They are locally known as the "inner bluegrass region", a section of reddish-brown soils; the hill lands, a section of hilly land, with associated stream terraces; and the white oak lands, where the soils are brown, grayish brown, or yellowish brown and have heavy clay subsoils. Each of these divisions has important soil differences which directly influence agriculture. Figure 2 shows the natural land divisions of Fayette County.

This county, with the exception of a strip of land about 6 miles wide that extends north and south through the east-central part, may be considered in the inner bluegrass region of central Kentucky. The soil materials of this section are residual from limestone. The soils are reddish brown, and are considered the most desirable general farming soils in this part of Kentucky. They are famous for their natural ability to produce very nutritious bluegrass pastures, white burley cigarette tobacco, corn, wheat, and red clover, and their crop adaptations in general are limited only by the prevailing climatic conditions. The soils are derived from phosphatic limestones and for this reason are naturally high in phosphorus. Most of this section is occupied by comparatively large farms on which are elaborate and expensive farm buildings and equipment. These reddish-brown soils of the inner bluegrass region are known to be extensively developed over an area of approximately 1,000 square miles including parts or all of Fayette, Scott, Franklin, Woodford, Anderson, Mercer, Jessamine, Garrard, and Boyle Counties.

The area of hill lands is rather small, and the soils are varied in composition and characteristics. Most of these soils range from neutral to alkaline in reaction. They are comparatively high in potassium, and most of them are coarse-granular silty clays which are either gray, dark gray, or dark drab. Many rock fragments are scattered over the surface. These soils are developed on the slopes of a narrow band of hills that immediately encircle the inner bluegrass region, beyond which is the outer bluegrass region of central Kentucky.

The white oak land, or beech-ridge soils as they are called locally, comprise a region of brown, grayish-brown, and yellowish-brown soils which have tough plastic clay subsoils. These soils were originally occupied by a dense forest of oak, hickory, and beech, from which the soils derive their local names. This part of the

county is not hilly but is rather rolling, and stream dissection is comparatively recent. The soils in general are of lower productivity than the soils of either the inner bluegrass region or the hills. These soils are rather strongly leached and for this reason are acid to bedrock. Their subsoils are, for the most part, stiff clays and do not allow rapid internal drainage after heavy rains

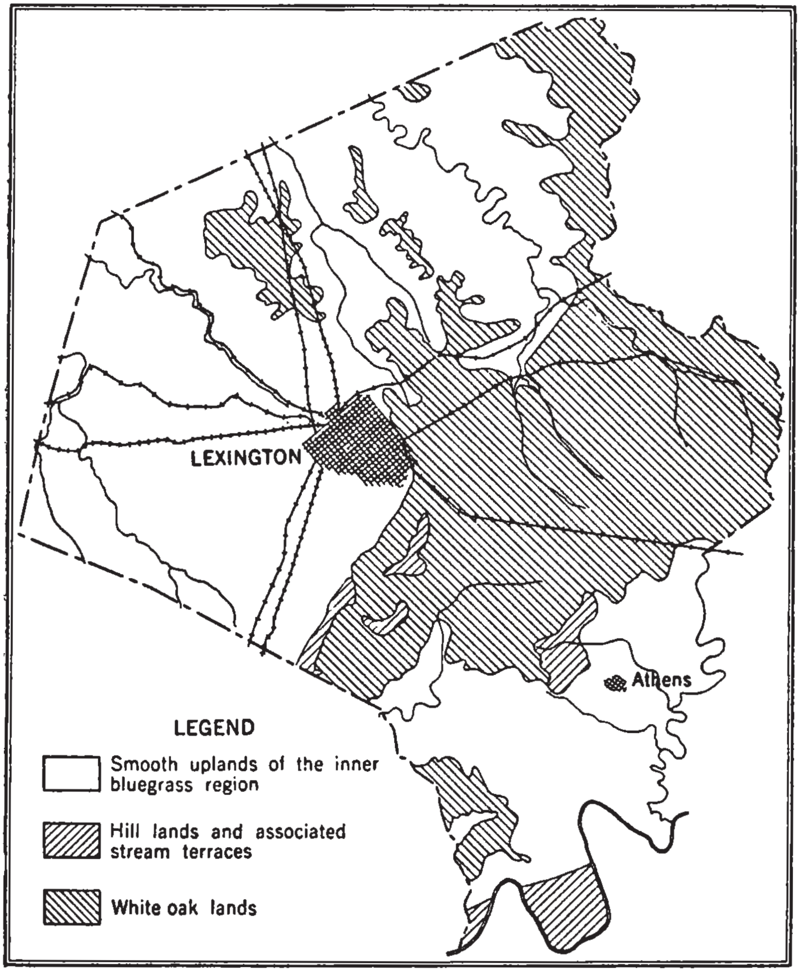

FIGURE 2.—Natural land divisions of Fayette County, Ky.

or snows. For this reason these soils are rather slow in warming up in the early spring. Even though these soils range from medium to strongly acid, they produce fairly good yields of such crops as tobacco, corn, wheat, soybeans, and redtop and timothy hay. The normal soils are too acid for the profitable production of red clover or alfalfa, unless heavy applications of lime are made.

The occurrence of these 3 soil divisions in Fayette County has naturally created the 3 agricultural divisions within the county.

The surface relief ranges from rolling to undulating, and parts are not adapted to a continuous system of cultivation of the land, because of the loss of soil by erosion on many of the slopes. The difference in depth of the various soils has been determined, to some extent, by the amount of dissection and erosion which has occurred since the late geological uplift of central Kentucky. The deeper soils are on the ridges or along the drainage divides, and the soils nearest the streams, not including the narrow areas of bog soils, are in general the shallowest. Along the larger streams the soil is shallower adjacent to the stream channel or flood plain. Bluegrass is grown extensively and effectively without soil erosion on the more sloping land, and it provides excellent pasture.

Nearly 95 percent of the land in the county has been cleared and cultivated, and practically no virgin forest land remains. All the reddish-brown soils and practically all the grayish-brown, brown, and yellowish-brown soils are or have been under cultivation. Some have been under cultivation nearly 125 years, yet they produce fairly good crop yields without the use of fertilizers. Fields on the reddish-brown soils are rather large, and labor-saving machinery can be used to advantage.

The amount of land under cultivation in the hills ranges from 5 to 50 percent of the total farm acreage, depending on the steepness of slopes. Many fields in the hill section have slopes ranging from 8 to 25 percent, and loss of soil by sheet erosion has been so great that many poorly managed fields have been abandoned. In extreme cases practically all the soil has been removed by erosion and only the bare rocks or shales remain, on which a scattered and stunted growth of cedars and other brush is attempting to survive, where formerly the layer of soil was fairly deep.

The amount of cultivated land in the section occupied by the brown, grayish-brown, and yellowish-brown soils differs considerably, depending on the fertility of the soil, the extent to which erosion has taken place, and the tenure of the land. In general, the farms in this section are about the same size as those in the reddish-brown soils section, but the farm buildings and farm equipment are of much lower value.

The soils and climatic conditions allow the growing of a wide variety of crops but, in general, these conditions seem to be most favorable to the production of tobacco, corn, wheat, oats, rye, clover and timothy hay, and bluegrass pastures, from which a large quantity of bluegrass seed is harvested. These crops have been grown throughout the county for many years, irrespective of the local differences in the soils. Unfortunately, many farmers have continued to grow the same crops on the same soils or in the same fields year after year. Few important changes in agricultural methods or practices have taken place for several years so far as methods of tillage of the soils, growing of crops, or kind of crops grown are concerned.

Two major types of agriculture are practiced. One is specialized livestock farming, which may largely be assigned to the breeding, raising, and training of race horses. This type of livestock farming is a highly specialized business and involves a large amount of capital and expensive equipment. The second type of agriculture is that of general farming, in which the enterprise is carried on for the produc-

tion of general farm crops, market livestock, and livestock products, such as dairy and poultry products. Neither of these types of agriculture is exactly correlated with any specific soil region, but in general the stock farms, where race horses are raised, are located in the region of reddish-brown soils, which is also a region of high-phosphate soils. General farming and the production of general farm crops in connection with livestock raising are fairly well developed throughout the county, with the greater proportion of the stock farms occurring in association with the general agricultural farms in the northwestern part.

Tobacco is grown on practically every farm, but this crop seems to be especially well adapted to the reddish-brown soils of the inner bluegrass region.

The maximum corn yields are obtained on the reddish-brown soils or the dark-brown soils of the stream bottoms.

Clover and timothy and clover mixed are grown chiefly because of their adaptation to the soils of this county. Most of the soils are too acid for the growing of alfalfa unless they are limed, but clover can be grown without an application of lime on most soils.

Soybeans are grown more extensively throughout the eastern part of the county than the western part, where the soils are less acid and more adapted to the production of clover.

Kentucky bluegrass, which grows luxuriantly on practically all soils, is the main grass crop. Its sod-forming habit of growth makes it an excellent grass to use as a soil binder in preventing destructive erosion. Clover, which is a little more fibrous rooted, is able to withstand the winter heaving of the soil better than alfalfa and for this reason does not winter-kill so easily. The type of climate is probably more responsible for this condition than the character of the soils.

Before discussing the soils in detail and the relation of the different soils to the production of crops, a brief explanation of the terms used in the discussion is given. The term soil texture refers to the size of the individual soil grains. They range in size from coarse sand grains to particles too small to be seen by the most powerful microscope. In field mapping the texture is determined by the feel of the soil. By mechanical analysis in a laboratory, the texture of the soil may be determined precisely. According to the relative percentages of sand, silt, and clay, the soil is described as sand, sandy loam, loam, silt loam, clay loam, or clay, in texture.

In the field mapping of soils three units are used—soil series, soil type, and soil phase. Most important of these is the series which includes soils having essentially the same color, structure, and thickness of the several horizons of the soil profile. The soils in a given series have the same drainage and approximately the same relief and conditions of parent material. The series are given geographic names taken from the location in which they were first recognized.

Within the soil series are soil types determined chiefly on the basis of the texture of the surface soil layer, such as sandy loam, silt loam, silty clay loam, clay loam, or clay. The complete name of a soil consists of the series name plus the class name of the surface soil texture. Thus Maury silt loam and Maury silty clay loam are

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2 soil types in 1 series. Minor differences within soil types are designated as phases, and the resultant designation may be Maury silt loam, yellow phase, or Maury silt loam, slope phase.

The materials from which the soils of Fayette County have developed have weathered from the underlying limestones and shales. The rocks are broken down by the physical and chemical processes of weathering to form parent material for soil. For example, the percolating waters, carrying carbonic acid and other weak acids, tend to dissolve the limestones, leaving only the more resistant impurities behind. From the materials produced by weathering, soils are developed through the influence of plants. The soils differ in physical character and fertility, according to differences in surface relief, drainage, and other environmental factors.

The soils of the county may be grouped on a regional basis into three main soil groups: (1) Reddish-brown soils of the inner bluegrass region, which are soils comparatively high in phosphorus and having permeable semiplastic or nonplastic subsoils; (2) the brown, grayish-brown, and yellowish-brown soils of the white oak lands, which have rather heavy plastic clay subsoils; and (3) the miscellaneous soils of the hill lands, which in general have permeable subsoils and are less acid than the soils of the other two groups. These three divisions were established in part on the basis of color of the surface soils and character of the subsoils, but they have other important soil differences, such as depth, clay content of the surface soils and subsoils, surface and subsoil drainage, susceptibility to erosion, degree of slope, acidity or alkalinity, and content of lime, phosphorus, and potassium. These differences in soil characteristics are discussed in detail in the following pages and the agricultural relationships of the soils are brought out; the location and distribution of the different soils are shown on the soil map; and their acreage and proportionate extent are given in table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Fayette County, Ky.*

Type of soil	Acres	Per-cent	Type of soil	Acres	Per-cent
Maury silt loam	28,864	15.9	Burgin silty clay loam	448	0.2
Maury silt loam, slope phase	52,928	29.2	Loradale silt loam	17,920	9 9
Maury silt loam, yellow phase	2,816	1 6	Mercer silt loam	13,568	7.5
Maury silt loam, gray-brown phase	3,520	1.9	Mercer silt loam, friable-subsoil phase	64	.1
Maury silt loam, imperfectly drained phase	896	.5	Mercer silt loam, colluvial phase	192	.1
Maury silty clay loam	384	.2	Mercer silty clay loam, eroded phase	21,696	12.0
Maury silty clay loam, slope phase	8,768	4.8	Robertsville silt loam	64	.1
Hagerstown silt loam	8,896	4.9	Muskingum loam	640	.3
Hagerstown silt loam, slope phase	512	.3	Culleoka silt loam	640	.3
Huntington silt loam	3,008	1 7	Eden silty clay	640	.3
Huntington silt loam, high-bottom phase	4,800	2.7	Salvisa silty clay loam	2,368	1.3
Huntington silt loam, colluvial phase	1,408	.8	Fairmount silty clay loam	64	.1
Huntington loam	128	.1	Maury stony silty clay	2,752	1.5
Elk silt loam	320	.2	Rock outcrop	2,624	1.4
Cumberland silt loam	192	.1	Total	181,120	-----

REDDISH-BROWN SOILS OF THE INNER BLUEGRASS REGION

The reddish-brown soils of the inner bluegrass region are without question the most important and most desirable agricultural soils in the county. They are practically all under cultivation or

devoted to bluegrass grazing lands. They occupy a total area of 184.2 square miles, most of which is in the western two-fifths of the county. The eastern boundary of this soil region enters Fayette County about one-tenth of a mile east of United States Highway No. 27, extends north in an irregular line to the northeastern corner of Lexington, where it turns northwest continuing for a distance of about 2 miles, thence east to North Elkhorn Creek near Bryan Station Spring, thence in an irregular northwest course, leaving the county about 1½ miles northwest of Loradale. This entire area, with the exception of a few small bodies, the largest of which centers around Greendale, comprises reddish-brown soils. Another area of the reddish-brown soils is developed across the southeastern corner of the county. The western boundary of this area enters the county about 1 mile northwest of East Hickman, extends northeastward along an irregular line to a point about three-fourths of a mile west of Athens, thence northeastward to a point near Pine Grove. The eastern and southern boundaries of this area are determined by a geological fault line that runs in a northeast-southwest direction across the loops of Kentucky River. In addition to these two main areas of reddish-brown soils, many very small areas occur in association with the brown, grayish-brown, and yellowish-brown soils of the county.

Included with the group of reddish-brown soils are associated soils of the stream bottoms and terraces, classified as Huntington, Elk, Cumberland, and Burgin soils.

All the soils of this group are some shade of reddish brown or chocolate brown when moist, but when dry they become duller brown. They are all loose, mellow, or velvety silt loams or silty clay loams. They are very friable and are easily tilled under a wide range of moisture conditions. They may even be cultivated soon after a rain without danger of puddling or causing the soil to dry out in hard clods or lumps. During periods of drought these soils seldom crack or become hard. As a whole they have a comparatively thick mantle of soil and soil material on the ridge tops, ranging from 6 to 16 feet in thickness, with a general average of 8 or 9 feet. The subsoils are semiplastic or nonplastic silty clays or clay loams, which allow rapid movement of soil water and are easily penetrated by plant roots.

The soils of this group are not so open or porous that they dry out easily during droughts but are sufficiently so to absorb and hold in storage large quantities of soil water, which is a very important factor in any good farming soil. They are naturally fertile and have the potential ability to produce a wide variety of crops, but under the prevailing climatic conditions they seem to be especially well adapted to the production of corn, wheat, red clover, burley tobacco, and Kentucky bluegrass. Even though they are developed from limestones or are underlain by limestones, they are a little too acid for the satisfactory growth of alfalfa, but good yields of red clover are produced. Several of the more progressive farmers report that after liming their soils they were able to obtain fair yields of alfalfa and that yields of wheat, clover, and corn seem to be improved. The addition of lime to an acid soil tends to hold within the soil more organic matter which, in turn, will stimulate the accumulation of nitrogen, one of the most needed plant nutrients

throughout the reddish-brown soils. Liming acid soils is always beneficial to nitrogen fixation by the nitrogen-fixing bacteria (*Azotobacter*) which thrive only in faintly acid or alkaline soils. Liming soils for the production of tobacco may not prove beneficial and may lower the quality of the tobacco.

Because these soils are in no special need of plant nutrients, except nitrogen and possibly potash, it is a simple problem to maintain or increase the nitrogen and organic-matter supply by liming and then growing legumes or grasses in a suitable crop rotation. By proper soil management and crop rotations a high level of productivity can be maintained in most of these soils. Where the soils are susceptible to erosion, special care must be taken in the choice of crops.

The Maury soils are by far the most important soils of this group. They occupy approximately 83 percent of the land occupied by the reddish-brown soils, and the Hagerstown and Huntington soils occupy nearly 16 percent. The Maury soils occupy rather smooth or gently rolling areas or areas which are interrupted only by small drains and sinkholes that form the surface and underground drainage system.

Maury silt loam.—Maury silt loam occupies 28,864 acres in the uplands of Fayette County, and it is extensively developed over the entire area of reddish-brown soils. This soil and parent material average about 8 feet in depth to bedrock, but the depth ranges from as little as a few inches to 18 feet. The 8- to 10-inch surface soil is mellow loose friable rich-brown or reddish-brown silt loam that is easy to cultivate at almost any moisture content. The subsurface soil, to a depth of 20 inches, is lighter brown but is friable and slightly granulated. The upper subsoil layer, between depths of 20 and 40 inches, is heavy-textured silty clay loam which is compact and only faintly plastic or sticky when wet; the lower subsoil layer is less plastic and less compact than the upper layer; and the entire subsoil is an open semifriable well-drained and well-aerated rich reddish-brown silty clay loam. The soil is easily penetrated throughout by rain water and plant roots. The water-holding capacity is rather high, and during periods of drought the water moves freely within the soil to supply the water requirements of growing plants. Less erosion has taken place on this soil than on any other upland soil in the county. The surface soil and subsoil of this soil are medium acid.

Corn grown on this soil yields from 40 to 50 bushels an acre, wheat 15 to 25 bushels, oats 20 to 40 bushels, clover 1 to 2 tons, and tobacco 800 to 1,200 pounds.

Maury silt loam, slope phase.—Maury silt loam, slope phase, is similar, in all essential soil characteristics, to typical Maury silt loam, but it is not so deep and occupies the shoulders of slopes or narrow ridges instead of the broader more level areas. The average depth to bedrock is about 5 feet. Because of its more pronounced surface relief, this soil is subject to more soil erosion than typical Maury silt loam. The texture of the surface soil is somewhat heavier and is about midway between silt loam and silty clay loam. This soil occupies more than 50 percent of the total area of Maury soils. Although the same crops—corn, wheat, tobacco, clover, and blue-

grass—are commonly grown on the slope phase as on typical Maury silt loam, yields are slightly less, owing to the fact that the more sloping land may lose some of its fertility by soil erosion when cultivated. Crops are not able to withstand drought quite so well on soil of the slope phase as on the typical soil.

Maury silt loam, yellow phase.—Maury silt loam, yellow phase, is similar to typical Maury silt loam in all respects except color. It does not have the rich-brown color characteristic of the typical Maury soils. It is developed chiefly on ridge tops along the boundary lines between the areas of reddish-brown soils and the areas of brown, grayish-brown, and yellowish-brown soils. The productivity of this yellow soil is not quite so high as that of typical Maury silt loam. Crop adaptations are similar, and the surface relief and drainage are typical of the Maury soils. Areas of this soil occur near Athens, near Hillenmeyer, and southwest of Lexington.

Maury silt loam, gray-brown phase.—The gray-brown phase of Maury silt loam includes the more level areas of the Maury soils. The grayness of the surface soil is caused by leaching which has operated longer on this soil than on any other Maury soils. This soil has the lowest content of phosphorus and the greatest acidity of the Maury soils mapped in the county. Surface drainage is not rapid enough to cause any loss of the surface soil by erosion, as in the typical soil. For this reason there is not the constant renewal of the soil through gradual deepening, and the productivity level is below that of the typical Maury soils. Bodies of this soil occur on the high lands south and west of Lexington.

Maury silt loam, imperfectly drained phase.—Maury silt loam, imperfectly drained phase, occupies an area of 1.4 square miles, all of which lies southwest of Lexington along or near United States Highway No. 27.

The 10-inch surface soil is grayish-brown or dark grayish-brown silt loam. The subsoil ranges from yellowish-brown or rust-brown silty clay loam to mottled brown, gray, and yellowish-brown clay, and it extends to a depth of 5 feet.

This soil occupies a rather flat area and has insufficient subsoil drainage. It is slightly more acid than the adjacent upland soils. It is utilized chiefly for bluegrass pastures and suburban city lots.

Maury silty clay loam.—Maury silty clay loam occurs on some fairly steep slopes throughout the western part of the county, where the surface soil and in many places the subsoil have been washed away by erosion, and only the parent soil materials remain. This soil is suited only to growing pasture grasses, because it occupies comparatively steep slopes and is easily eroded.

Maury silty clay loam, slope phase.—The slope phase of Maury silty clay loam is similar to Maury silt loam, slope phase, but it is much shallower, and in many places the underlying limestones are exposed at the surface. The average thickness of the soil material is about 2 feet. This soil occurs in rather narrow irregular areas, chiefly on the steeper slopes next to the drainage channels. The total area is small. Most of the land is devoted to bluegrass pasture.

Hagerstown silt loam.—Hagerstown silt loam occurs only in small areas scattered throughout the brown, grayish-brown, and

yellowish-brown soils region and on the higher ridges of the reddish-brown soils region. This soil is developed chiefly along narrow ridges where drainage is exceptionally well developed. The Hagerstown soils, with the exception of only a few areas, are similar to the Maury soils. The surface soils are rich brown when moist and light brown when dry. The weathered soil materials, which underlie the subsoils of the Hagerstown soils, are more yellow in contrast to the brown or chocolate-brown color of similar materials underlying the Maury soils. The Maury and Hagerstown soils show little difference in depth, but where any difference exists it is in favor of the Hagerstown. The surface relief of the Hagerstown soils is somewhat more rolling than that of the Maury soils. Another difference between the Hagerstown and Maury soils is the layer of iron and manganese oxide materials, which occurs above the yellow layer of parent materials underlying the Hagerstown soils. These materials occur as hard pieces of brown and blackish-brown hard nuggets which range in size from that of a pea to 4 inches in diameter. The Hagerstown soils do not have so large a content of phosphorus as the Maury soils. In general they are more acid in reaction and have a lower lime content. The Hagerstown soils are a little more susceptible to soil erosion and have been eroded more than the Maury soils since they have been brought under cultivation.

Hagerstown silt loam has the same general crop adaptations as Maury silt loam, but crop yields, in general, are slightly lower. The Hagerstown soil probably is a better soil for fruits and berries than the Maury, owing to the fact that it occupies ridge tops and has very good air and water drainage, which are important factors in locating orchards. Practically all of Hagerstown silt loam is under cultivation, and corn, wheat, tobacco, clover and timothy, some alfalfa, and bluegrass are grown.

Hagerstown silt loam, slope phase.—A few small areas of Hagerstown silt loam, slope phase, are mapped south of Lexington. This soil is similar in general characteristics to typical Hagerstown silt loam, but it is subject to more erosion when cultivated, the surface soil is shallower, and the productivity is lower. Areas of the slope phase occur on the slopes immediately below the main bodies of Hagerstown silt loam. The crop adaptations of this soil are somewhat similar to those of typical Hagerstown silt loam except that cultivated crops cannot be grown as generally, owing to the susceptibility of the soil to erosion.

Huntington silt loam.—Many of the streams that form the drainage system of the reddish-brown soils region have built up narrow bottoms or valley lands as a result of flood-water deposits of material washed down from the neighboring uplands. The larger and better drained areas of the soils on such bottoms are classified as Huntington silt loam. Most of this soil lies along South Elkhorn Creek, Town Branch, East Hickman Creek, West Hickman Creek, and tributaries of these streams.

All the Huntington soils on the first bottoms are very dark brown, range from neutral to alkaline in reaction, are extremely high in available plant nutrients, and are generally more than 5 feet in depth. Much of this land is occupied by trees, because most of the areas are not more than 300 feet wide.

The cultivated land is devoted almost entirely to corn or tobacco. Corn yields from 50 to 90 bushels an acre if not destroyed by floods. These bottoms are seldom overflowed more than 2 or 3 hours at a time, and they are well drained except during short periods of overflow.

Huntington silt loam, high-bottom phase.—The high-bottom phase of Huntington silt loam occupies the older flood plains of North Elkhorn Creek and its tributaries. This soil lies between the Huntington soil of the low first bottoms and the adjoining uplands. All of this high-bottom soil is dark brown, is exceptionally well drained, and is rarely overflowed. Most of it has lain in place long enough to have become slightly acid through the soil-leaching processes characteristic of this region.

The surface soil is mellow friable silt loam which is underlain by a slightly lighter colored compact heavy silt loam or silty clay loam subsoil. This soil and the underlying soil material range in depth from 5 to 15 feet.

Most of the land is under cultivation and is devoted to corn, tobacco, some wheat, and, in places, vegetables. About 25 percent of it is in bluegrass pasture. Crop yields are similar to those on typical Huntington silt loam.

Huntington silt loam, colluvial phase.—Huntington silt loam, colluvial phase, consists of accumulations of soil material along the smaller streams or drains where much recent material has been washed from the adjacent slopes as a result of soil erosion. Most of the bodies are very narrow.

Only about 25 percent of this soil is under cultivation, and trees, brush, weeds, and grasses occupy the remaining 75 percent. The land is fertile and where cultivated produces high yields of tobacco or corn. It is subject to frequent overflow, and occasionally crops may be covered by new deposits of sediments.

Huntington loam.—Huntington loam is a soil on the first bottoms lying along Kentucky River. It is dark brown, slightly acid, and ranges from loam to silt loam in texture. It is derived from soil materials washed from the mountains of eastern Kentucky. Very little of the land is cultivated, because it occurs in very narrow strips close to the river.

Elk silt loam.—Elk silt loam comprises the greater part of the soils of the Kentucky River bottoms. This soil, as a whole, is well drained, is seldom overflowed, and is practically all under cultivation, mostly to corn. It is slightly acid in reaction.

Cumberland silt loam.—Cumberland silt loam occupies land which might be called uplands, at the junction of Boone Creek and Kentucky River. This soil resembles Maury silt loam in many respects. It consists of brownish-yellow or yellowish-brown silt loam containing various quantities of water-worn gravel and cherty materials. The subsoil is rather plastic or claylike. The surface soil is medium acid in reaction.

The surface relief is very rolling, and in places the soil has suffered erosion, especially where poorly managed. The land is marked by numerous sinkholes and remnants of old river potholes. The main crops are tobacco, corn, and bluegrass, all of which produce good yields, although yields vary considerably, depending on the slope and depth of the soil.

Burgin silty clay loam.—Burgin silty clay loam occurs along small drains in the northern and western parts of the county. The largest areas are along Steeles Run and a small tributary of Cane Run.

This is a nearly black alkaline soil developed on first bottoms and in depressions. It has a bluish-gray and yellow mottled subsoil. The land is subject to frequent flooding, and for this reason most of it is devoted to bluegrass pasture. Some of the better drained areas that have good surface drainage are cultivated, and such crops as corn, tobacco, and vegetables are grown. This soil is very productive where well drained.

BROWN, GRAYISH-BROWN, AND YELLOWISH-BROWN SOILS OF THE WHITE OAK LANDS

These soils occupy a total area of 83.6 square miles. Their main occurrence is east of Lexington in an area extending completely across the county in a north-south direction between two distinct bodies of the reddish-brown soils. The surface relief ranges from undulating to rolling.

Agriculturally these soils are in general less fertile than the reddish-brown soils. The lime has been leached out and, as a whole, the soils range from moderately to strongly acid to bedrock or to the underlying shales.

This soil division is occupied by the Loradale, Mercer, and Robertsville soils. The Loradale soils and the Mercer soils occupy by far the greater part. The Mercer soils occur mainly on the higher level areas or ridge tops, and the Loradale soils in general occupy the lower levels between the Mercer soils and the Maury or Hagerstown soils. The Loradale soils are brown and are better drained than the Mercer soils which are yellowish brown.

Loradale silt loam.—Loradale silt loam occupies an area of 28 square miles, or approximately 33.5 percent of the white oak lands. Most of this soil occurs in irregular areas throughout the eastern part of the county, the larger bodies lying south and west of Avon.

The 6- or 8-inch surface soil consists of loose mellow brown silt loam which in many respects seems to be very much like Maury silt loam, but the subsoil is brownish-yellow plastic clay. The loose mellow silt loam layer extends to a depth of about 12 inches, below which the soil texture changes to silty clay loam and becomes more claylike with increase in depth. At a depth of about 3 feet the color is more yellow and the plastic brownish-yellow clay continues downward to the parent material. At a depth of about 6 feet the clay becomes less plastic and feels smoother in consistence.

Loradale silt loam is medium acid in reaction, low in lime content, and not so fertile as the reddish-brown soils, but it is more fertile than the Mercer soils. The same general farm crops are grown as are grown on the Maury soils. Bluegrass is grown without difficulty on all areas of the Loradale soil, and approximately 50 percent of the land is devoted to bluegrass pasture. Acre yields of corn range from 35 to 45 bushels and of tobacco from 700 to 1,100 pounds.

Mercer silt loam.—Mercer silt loam occupies an area of 21.2 square miles, all of which is on the more level ridge tops or gentle slopes where erosion has removed very little of the surface soil.

The 6- or 8-inch surface soil ranges from brown to yellowish-brown fluffy silt loam that is moderately acid. Between depths of 8 and 30 inches the soil material is rather compact and slightly mottled with gray and yellow and with brown stains and specks. The material in this layer is not plastic or sticky, but in general it is slightly more acid than the surface soil. The lower part of the subsoil changes to tough plastic clay that contains black specks and bluish-gray, yellow, and rust-brown splotches. This soil ranges in depth from 5 to 15 feet and is underlain by shattered beds of intermixed shales and limestones. The entire soil mass is acid in reaction to a depth within a few inches of the limestone.

Such crops as corn, wheat, some oats, redtop and timothy hay, and tobacco return fair yields. Corn yields range from 15 to 40 bushels an acre, depending on the season and management of the soil. Wheat yields from 8 to 15 bushels without the use of fertilizers, but where properly fertilized, the yield may be increased.

Mercer silt loam responds readily to fertilizer treatment, and by the proper use of fertilizers, in connection with heavy applications of lime, could be made to produce reasonably good crop yields. This soil is more in need of fertilizer and liming than any other soil in the county.

Approximately 40 percent of Mercer silt loam is cultivated, and the rest is in pasture. Bluegrass is not highly productive on this soil and, if compelled to compete with weeds or worthless wild grasses, under heavy grazing, it becomes crowded out. Several of the pastures on this soil are largely occupied by acid-tolerant ragweed, wild oatgrass, plantain, and sour dock, none of which is of any value as feed for livestock. Recently soybeans have been introduced as a hay crop on the Mercer soils.

Mercer silt loam, friable-subsoil phase.—Mercer silt loam, friable-subsoil phase, resembles typical Mercer silt loam in all characteristics except the friability of the subsoil. This soil seems to have been more strongly leached and weathered than typical Mercer silt loam. It is strongly acid, and the clay in the subsoil is not plastic or sticky as is the clay in the subsoil of typical Mercer silt loam. Crop adaptations are similar to those of typical Mercer silt loam, but it is difficult to obtain a stand of bluegrass on this soil, because of its low fertility and leached, acid surface soil.

Mercer silt loam, colluvial phase.—The deposits from which Mercer silt loam, colluvial phase, is developed consist of soil materials washed from the slopes of Mercer silty clay loam, eroded phase. These soils are light brown in color, medium in acidity, and occupy very small and extremely narrow bodies along the drainage channels of streams that rise in the areas of Mercer and Loradale soils. Only about 10 percent of the land is under cultivation.

Mercer silty clay loam, eroded phase.—Mercer silty clay loam, eroded phase, is similar to Mercer silt loam, except that it occupies the steeper slopes and the silt loam surface soil has been carried away by erosion, leaving the silty clay loam subsoil exposed to form the present surface soil. This soil covers a total area of 33.9 square miles, chiefly along or around the sources of small drains. Many of the bodies are the result of gully erosion as well as sheet erosion.

This soil is largely devoted to pasture, as the land under cultivation suffers from sheet erosion. Such crops as wheat, corn, redtop and timothy, some red clover, and tobacco are grown, but yields are rather low.

Robertsville silt loam.—Robertsville silt loam occupies poorly drained spots or depressions, with a total area of only 64 acres. The largest body is southwest of Lexington. The surface soil is whitish-gray silt loam, and the subsoil is plastic bluish-gray, yellow, and rust-brown mottled silty clay. The land is in need of drainage. It is occupied by scrubby brush and weeds.

SOILS OF THE HILL LANDS

These soils occupy only 5.2 percent of the total area of Fayette County, and they occur mainly on the steeper slopes and rougher lands of the southeastern part. The group includes Muskingum, Maury, Culleoka, Eden, Salvisa, and Fairmount soils and the nonarable stony land—rock outcrop.

Muskingum loam.—Muskingum loam lies on the very high ridges and upper slopes of the rough hilly land within the meander loops of Kentucky River. This soil is derived from interbedded sandstones and low-lime shales. The surface soil is light-brown loam, and the subsoil is light yellowish-brown silt loam or loam. The entire soil mass contains fragments of rock. This soil includes steep slopes that are subject to considerable erosion when cultivated. About 35 percent of the land is cultivated, mainly to tobacco, corn, and fruit. The quality of the tobacco produced is high.

Culleoka silt loam.—Culleoka silt loam occupies the steeper slopes immediately below the areas of Muskingum loam. The surface soil is brown silt loam, and the subsoil is yellowish-brown silty clay that contains fragments of shale and limestone. This soil has the same crop adaptations as Muskingum loam, except that no fruit is grown on the Culleoka soil.

Eden silty clay.—Eden silty clay occurs in small bodies south of Lexington. This soil is variable in color, ranging from grayish brown where it is badly eroded to very dark grayish brown where the land has never been cultivated. It is derived from calcareous shales and thin-bedded limestones. It ranges from neutral to alkaline in reaction. As it occurs on rather steep slopes, as a rule it is not cultivated but is devoted to bluegrass pasture, to which it is best adapted. A few selected areas produce very good yields of alfalfa hay.

Salvisa silty clay loam.—The main development of Salvisa silty clay loam is over a section of rather sloping land about 2 miles west of Athens. This soil is drab rather granular or plastic silty clay underlain at a depth of about 3 feet by thin-bedded limestone. The soil is slightly acid and is subject to rather severe erosion. A few areas are devoted to clover, but the land is used mainly for bluegrass pasture.

A few areas of Salvisa silty clay loam lie northeast of East Hickman. In these the soil differs from the typical Salvisa soil in that it is less granular and more friable and mellow throughout. About 20 percent of this land is under cultivation, mainly to such crops as tobacco and wheat.

Fairmount silty clay loam.—Fairmount silty clay loam is a very dark gray or black soil derived from limestone materials. Small areas occur along small drains in the northeastern part of the county, chiefly on the northward-facing slopes. The soil is rather shallow, neutral or alkaline, and granular. It is all devoted to bluegrass pasture.

Maury stony silty clay.—Maury stony silty clay includes nontillable stony land which cannot be cultivated but is suitable for grazing land and the growth of bluegrass. This soil contains rock outcrops and loose rocks throughout the entire soil mass which in general is rather shallow.

Rock outcrop.—Rock outcrop includes the rough rugged cliffs, bluffs, canyons, and precipitous land bordering Kentucky River and Boone Creek. Scrubby cedars and stunted hardwoods are the only vegetation growing on this steep hilly land.

AGRICULTURAL METHODS AND MANAGEMENT[4]

The physical properties of the different soils in Fayette County have been discussed in detail elsewhere in this report, and the main purpose in this section is to discuss the cropping and management of the soils in relation to their chemical composition and the maintenance of productivity.

For practical purposes, the more extensive soils can be grouped according to their important characteristics and listed in order of agricultural value as follows: (1) The Maury and Hagerstown soils, (2) Loradale silt loam, and (3) the Mercer soils. No great difference exists between the soils of groups 1 and 2, but those of group 3 are of considerably less agricultural value.

The Maury soils were separated into various phases mainly because of differences resulting from differences in surface relief. One of these, the slope phase of Maury silt loam, is of considerable practical importance, because it is fairly extensive. Owing to its undulating or rolling surface relief, it is not well suited for frequent production of cultivated crops. Salvisa silty clay loam, located chiefly west of Athens and of small extent, can be included with the slope phases of the Maury soils, on the basis of agricultural value and soil management.

With the exception of the Mercer soils, the differences between the various extensive soil types are not large and therefore have not materially affected cropping and management. Of more importance has been the size of the farm, in conjunction with its adaptation to the production of white burley tobacco. On the larger farms, those of 200 acres or more, a smaller proportion of the land is in tobacco than on the smaller farms, and more of the land is in sod—mainly bluegrass and white clover. Greater emphasis is placed on the production of sheep and beef cattle, and practically all the stripping of bluegrass seed in the county is done on the larger farms. On the smaller farms shorter rotations are used, relatively more tobacco and other cultivated crops, mainly corn, are grown, and less emphasis is placed on raising sheep and beef cattle. Most of the dairying, carried on chiefly to supply the

[4] This section of the report was prepared by P. E. Karraker, associate professor of soils, Kentucky Agricultural Experiment Station.

Lexington market, is on the smaller farms. A considerable acreage of land, mostly in large farms, is used mainly for the breeding, raising, and training of standardbred and thoroughbred horses, and most of this land is kept in bluegrass pastures.

Some adaptation of crops to soil conditions is in effect on the Mercer soils, shown mainly in the smaller relative production of white burley tobacco than on the other extensive soils. The Mercer soils are not so well adapted to the production of high-quality tobacco, because of their compact subsoil layers, poorer drainage, and, in general, lower supply of plant nutrients. Loradale silt loam also, on the whole, is somewhat inferior to Maury silt loam for the production of high-quality tobacco.

In soil-survey work the location of the different soils must be determined in the field, largely on the basis of such observable characteristics as color, texture, tillage and drainage properties, and character of the underlying rocks. Important chemical characteristics, such as acidity and supply of plant nutrients, can be determined in the field only to a limited extent through simple chemical tests, but these chemical characteristics are more or less related to the observable characteristics mentioned, and the field divisions hold to a very large extent for them also, although the correlation in many places is not so good as is desirable. To obtain further information regarding the chemical composition of the soils in this county analyses were made of representative soils, the results of which are given in table 5.

The nitrogen content of the soils shows considerable variation, and the variation is almost as great within the individual soils as between different soils. The Mercer soils, however, average appreciably lower in nitrogen than the other extensive soils. With the exception of the Mercer soils, the content of nitrogen in most of the soils ranges from 3,000 to 4,000 pounds an acre in the plow layer (2,000,000 pounds of dry soil). This is considerably higher than the average for the State, which is probably not more than 2,500 pounds. Soils containing from 3,000 to 4,000 pounds usually will furnish crops with the nitrogen necessary for good yields, but constant attention must be given to the maintenance of the nitrogen supply. In no better way can this be done than by the common practice of keeping the land much of the time in bluegrass pastures containing a large proportion of white clover. This mixture maintains the nitrogen supply both by preventing erosion and leaching and by adding nitrogen from the atmosphere through the growth of the legume. It is especially desirable that the more rolling land, particularly the hilly land in the southeastern part of the county, be kept most of the time in sod crops.

Prevention of soil erosion is important in this county, as in all the inner bluegrass region. Erosion removes the surface soil containing the greater part of the humus and nitrogen and, where rock is near the surface, will in time reduce the thickness of the soil to such an extent that lack of moisture is a serious limiting factor in crop production. The average depth of soil and soil material over the bedrock in the inner bluegrass region is, perhaps, not greater than 8 feet, and even now, corn yields on the soils in this section are limited more by lack of moisture than by lack of plant nutrients.

On the land farmed in short rotations and cropped frequently in cultivated crops, careful attention should be given to the growth of legume crops to maintain the nitrogen supply. It is important also to have an effective cover crop on the land over the winter following a cultivated crop, to prevent erosion and leaching. The cover crop should be seeded as early as possible, in order that a good growth can be made during the fall. Barley and rye seeded early are much more effective cover crops than wheat seeded at the usual time.

The soils of the inner bluegrass region are characterized by a very large supply of phosphorus, as is shown by the large amount in most of the soils of Fayette County. A number of these soils contain more than 10,000 pounds an acre in the plow layer, whereas the average soil in Kentucky outside the bluegrass region contains about one-tenth as much. In general, soils containing 2,000 pounds or more of phosphorus an acre in the plow layer furnish to crops the amount needed for good yields without the use of phosphate fertilizers, if the soil is well managed. The soils of the county show a wide range in the phosphorus content. The Maury soils on the average are higher in phosphorus than the other soils; the Hagerstown and Loradale soils also are well supplied with this nutrient. The amount of phosphorus in all these soils is sufficient for fair to large yields of crops without the use of phosphate fertilizers. Some of the Mercer soils are also well supplied with phosphorus, but in others this nutrient is comparatively low and probably deficient for production of large crops. Tests for the need of phosphate fertilizers should be made on the latter soils.

Except in a few soils, the potassium content ranges from 23,000 to 30,000 pounds an acre in the plow layer. This is the normal amount in soils in Kentucky and, with proper drainage and farming methods, enables fair to good-sized crops to be produced without the use of potassium fertilizers. However, when nitrogen and phosphorus—the most common limiting nutrients—are amply supplied, as is true with many of the soils of the inner bluegrass region, it is more likely that the requirements of the large crops will reach the limit of supply of available potassium, and the use of potassium fertilizers will be profitable. This is particularly true for crops with comparatively large potassium requirements, such as tobacco, alfalfa, or potatoes. The Eden soils are especially high in potassium.

Two methods were used to determine the acidity of the soils. By one the amount of pure ground limestone necessary to bring the soils to neutrality under the conditions of the laboratory procedure is determined. By the other the pH value of the soils is determined. This value is an expression of relative soil acidity and indirectly of the soil supply of calcium able to function as lime. The lower the pH value, the more acid the soil, pH 7 being considered neutral. In general, alfalfa and sweetclover grow best at pH 6.5 to 7.5; red clover, alsike clover, and white clover, pH 6 to 7; tobacco, pH 5 to 6; and most other farm crops, pH 5.5 to 6.5. It should be kept in mind that a crop—corn, for example—that may not be directly benefited by liming to a pH value near the neutral point, probably will be benefited indirectly from the better legume growth on such soils.

Most of the soils range from medium to slightly acid. The Eden soils, which are of small extent, are slightly acid or slightly basic.

These are the soils which form the belt characterized by hilly surface relief surrounding the inner bluegrass region. Alfalfa grows well on most of these soils without liming, and the high contents of phosphorus and potassium also adapt these soils to this crop.

With the exception of the Mercer soils, most of the soils will produce red clover more or less successfully without liming, although most of these soils contain no basic calcium materials such as limestone, but the large amount of phosphorus in them is in chemical combination with calcium which can function in a limited way as lime. Because of this fact, the Maury soils in general will grow better red clover than the Loradale soils and slightly better than the Hagerstown soils. Some of the Maury soils with the very high content of phosphorus, perhaps 12,000 pounds or more an acre in the plow layer, and a correspondingly high content of calcium, will grow fair alfalfa even without liming, when in a good state of productiveness. Considerable difference is to be expected in the growth of red clover on the unlimed Maury, Hagerstown, and Loradale soils, depending on their general state of productivity. For the most part no direct benefit should result from liming these soils for the general nonlegume farm crops, such as corn, barley, and tobacco, but these crops will be benefited indirectly from the increased nitrogen supply when better legume crops result from liming. The most certain way of determining the need for liming on these soils is through simple field tests made on the farms.

Because of their more acid condition, together usually with a lower supply of nitrogen and phosphorus, the Mercer soils produce a poor growth of red clover and many other legumes without liming, so that liming these soils is a valuable practice in maintaining or increasing their productivity.

Commercial fertilizers are being used to an appreciable extent, mainly in connection with the production of tobacco, and in connection with the small acreage of truck crops grown. Because of the high productivity of a large part of the soils and the small increase in crop yields to be expected from fertilizing, the practice of using fertilizers only on crops of high acre value is wise. Profit from the use of commercial fertilizers for tobacco in this county depends on a number of conditions, some of which differ from farm to farm. Whether their use will pay can be determined best by simple field fertilizer tests under the particular farm conditions. However, the following general statements may be made concerning the use of fertilizers for tobacco in the county:

Where the supply of soil nitrogen is deficient, the use of fertilizer nitrogen will increase the yield but probably not improve the quality. An excess of available nitrogen, whether from the soil or from fertilizer, lowers the quality of tobacco, producing a coarse tobacco of red color. Fertilizer nitrogen is too expensive to be used to an appreciable extent on such crops as corn, barley, or on pastures, but it may be used with profit on a crop having the acre value of tobacco; but even for this crop it is usually good farm practice to supply at least most of the nitrogen through the growth and proper use of legumes. Old sod land in a high state of productivity, land where considerable legume growth is to be turned under, or land where medium to heavy applications of farm manure have been made should not need nitrogen fertilizers.

Because of the large amount of phosphorus in most of the soils, it is not necessary to use a fertilizer that contains the usual high content of phosphoric acid in relation to the other nutrients carried. In fact, where it is known that the soils are very high in phosphorus, this element can be omitted.

Deficient supplies of potassium not only reduce the yield of tobacco but also very materially lower the quality. On this account the possibility of need for fertilizer potassium should be given careful attention and, in case of doubt, it is probably good farm practice to apply it. The use of potassium fertilizers is most likely to be profitable on land where drainage is somewhat deficient or where tobacco rusts badly or develops other abnormal physiological conditions, such as frenching. Alfalfa also is likely to need fertilizer potassium on many Fayette County soils. Liberal applications of manure usually supply sufficient potassium.

It is very important that the Mercer soils be in as high a state of productivity as possible when used for tobacco. Commercial fertilizers are much more likely to prove profitable for this crop on these soils than on the other soils in the county.

Extensive experiments on the use of lime and commercial fertilizers for tobacco and other crops have been made on the Maury soils on the Kentucky Agricultural Experiment Station farm near Lexington. These are reported in a recent bulletin.[5] This bulletin also contains specific information on the use of commercial fertilizers for tobacco and gives directions for making field tests of the need for lime and phosphorus.

CHEMICAL ANALYSES OF FAYETTE COUNTY SOILS[6]

The Maury soils are the most important in Fayette County and are the characteristic soils of the highly phosphatic area which includes the most fertile soils of the bluegrass region in central Kentucky. The Mercer soils contain about one-third as much phosphorus as the Maury soils, and the soils of these two series contain about equal proportions of other plant nutrients. Mercer silt loam is considered of somewhat less value than Maury silt loam for ordinary farming purposes.

The other soils, which make up the rest of the county, are much smaller in total area than either the Maury or the Mercer soils. In some of them the phosphorus content is equal to that of Maury silt loam.

Composite samples for chemical analysis were taken (by the field men) of the surface soil and subsurface soil of all except the very inextensive soil types. For the surface-soil samples about 10 borings each were made with a soil auger, from a representative area of each soil, to a depth of about 7 inches. The subsurface-soil samples were taken to a depth of 18 inches from the same holes. The samples were air-dried, crushed with a rubber pestle, and sifted through a screen having circular openings 2 millimeters in diameter. The materials too coarse to pass through the sieve were discarded, and the chemical analyses were made on the part which passed through.

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[5] ROBERTS, G., and KINNEY, E. J. SOILS AND FERTILIZER EXPERIMENTS, EXPERIMENT STATION FARM, LEXINGTON. Ky. Agr. Expt. Sta. Bull. 331, pp. [219]-265. 1932.

[6] This section of the report was prepared by O. M. Shedd, chemist, Kentucky Agricultural Experiment Station.

Analyses for total nitrogen, phosphorus, and potassium (the nutrients most likely to limit crop yields and which are contained in commercial fertilizers) were made according to the procedures described by the Association of Official Agricultural Chemists.[7] Soil acidity also was determined. The results of the analyses as obtained in the laboratories of the Kentucky Agricultural Experiment Station, are given in table 5.

TABLE 5.—*Chemical composition of the surface and subsurface layers of the more important soils of Fayette County, Ky.*[1]

Field no.	Soil type	Approximate location	Depth	Content per 2,000,000 pounds of dry soil: Total nitrogen	Total phosphorus	Total potassium	Calcium carbonate required to neutralize soil acidity[2]	pH[3]
			Inches	*Pounds*	*Pounds*	*Pounds*	*Pounds*	
2	Maury silt loam	United States Narcotic Farm, ½ mile north of Bracktown	0–7 7–18	4,632 2,224	4,940 3,940	23,800 24,800	72 18	5.7 6.1
5	do	½ mile west of Athens	0–7 7–18	3,724 1,984	13,220 15,320	25,200 26,200	72 36	5.7 6.1
6	do	2 miles northeast of Athens	0–7 7–18	3,076 1,840	5,900 6,580	25,800 27,600	54 54	5.7 5.7
23	do	Near Huffman Mill Pike, 1¾ miles south of Lemons Mill Pike	0–7 7–18	3,156 1,600	4,680 4,240	26,000 26,600	72 36	5.4 5.6
27	do	Near U. S. Highway No. 60, 1 mile southwest of junction with Clays Mill Pike	0–7 7–18	3,236 1,700	4,280 3,800	24,800 25,400	54 18	5.6 5.8
28	do	Near Pinckard Pike, ½ mile south of Pisgah Pike	0–7 7–18	2,872 1,720	2,400 2,040	26,000 26,400	54 36	5.6 5.9
30	do	Near U. S. Highway No. 68, 1¼ miles east of South Elkhorn Creek	0–7 7–18	3,300 1,580	2,400 1,880	24,800 26,200	18 36	5.7 5.7
20	Maury silt loam, gray-brown phase.	3 miles south of Lexington between Tates Creek and Nicholasville Pikes	0–7 7–18	2,812 1,660	2,880 2,360	24,600 24,200	36 18	5.5 5.6
9	Maury silt loam	Near Jacks Creek Pike, ⅙ mile east of junction with Dry Branch Road	0–7 7–18	2,752 1,416	4,780 4,380	23,800 24,000	72 72	5.6 5.9
18	do	Near Richmond Pike, ¼ mile east of junction with Grimes Mill Pike	0–7 7–18	2,076 1,760	21,560 27,680	24,600 25,400	None 36	6.0 5.8
24	Maury silt loam, slope phase.	Near Lemons Mill Pike, ¼ mile west of Huffman Mill Pike.	0–7 7–18	3,540 1,800	12,320 18,680	30,000 27,800	108 36	5.5 5.9
29	do	Near United States Highway No. 60, ⅛ mile east of South Elkhorn Creek.	0–7 7–18	3,056 1,740	7,120 14,520	27,200 33,400	36 18	5.7 6.1
32	do	Near Leestown Pike, ¼ mile southeast of junction with Dolan Lane Pike.	0–7 7–18	4,308 2,892	17,360 20,520	27,400 29,200	72 36	5.9 6.1
1	Hagerstown silt loam.	Southwestern corner of experiment station farm.	0–7 7–18	5,828 2,004	3,600 2,880	24,400 25,800	36 36	6.4 6.2
4	do	1¼ miles northwest of Avon.	0–7 7–18	4,552 1,944	2,520 1,940	24,400 24,200	126 36	5.4 5.7
10	do	½ mile east of Tates Creek Pike, 1½ miles south of junction with Walnut Hill Pike.	0–7 7–18	3,644 1,720	7,880 8,840	24,800 26,800	108 36	5.6 5.8

1 The determination of total phosphorus and the Hopkins tests were made by S. D. Averitt, chemist; and all other chemical analyses were made by O. M. Shedd, chemist, Kentucky Agricultural Experiment Station.

2 Hopkins method.

3 The pH values were determined by P. E. Karraker, using the colorimetric method. A few determinations were checked with the hydrogen electrode.

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7 ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS. OFFICIAL AND TENTATIVE METHODS OF ANALYSIS . . . Ed. 3, 693 pp., illus. Washington, D. C. 1930.

TABLE 5.—*Chemical composition of the surface and subsurface layers of the more important soils of Fayette County, Ky.*—Continued.

Field no.	Soil type	Approximate location	Depth	Content per 2,000,000 pounds of dry soil: Total nitrogen	Total phosphorus	Total potassium	Calcium carbonate required to neutralize soil acidity	pH
			Inches	*Pounds*	*Pounds*	*Pounds*	*Pounds*	
33	Hagerstown silt loam.	Near Richmond Pike and just west of the second reservoir from Lexington.	0–7 7–18	3,580 1,780	2,880 2,200	24,000 24,000	72 36	5.8 5.7
3	Loradale silt loam..	Near Briar Hill Pike, ⅛ mile west of junction with Clintonville Pike.	0–7 7–18	2,076 1,820	2,520 2,060	26,800 26,600	108 36	5.6 5.7
25	.....do.............	Near Iron Works Pike, ⅛ mile west of Newtown Pike.	0–7 7–18	2,832 1,640	3,400 3,480	23,400 24,400	18 18	5.7 5.7
13	Mercer silt loam....	Near Greenwich Pike, ⅛ mile south of Hume and Bedford Pike.	0–7 7–18	2,268 992	1,800 1,220	20,800 21,200	306 1,296	5.5 5.5
14	.....do.............	Near Harp and Innis Pike, 1 mile east of Greenwich Pike.	0–7 7–18	2,468 1,172	2,920 2,960	22,400 21,800	36 360	5.8 5.7
26	.....do.............	Near Kearney Pike, ¼ mile west of Southern Ry.	0–7 7–18	2,428 1,580	4,240 8,160	29,800 33,800	18 None	5.8 5.8
34	.....do.............	1 mile east of junction of Chilesburg and Athens-Boonsboro Pike.	0–7 7–18	2,692 1,276	1,560 1,160	23,600 25,400	72 612	5.4 5.6
12	Mercer silty clay loam, eroded phase.	Near Greenwich Pike, ⅛ mile south of Hume and Bedford Pike.	0–7 7–18	2,064 1,112	2,400 2,140	23,400 24,000	288 1,836	5.4 5.5
15	.....do.............	¼ mile south of Harp and Innis Pike, and 1 mile east of Greenwich Pike.	0–7 7–18	1,924 1,112	4,680 5,240	23,400 24,400	108 1,926	5.7 5.7
16	.....do.............	Near Muir Pike and ½ mile from Paris Pike.	0–7 7–18	2,892 1,336	6,360 13,240	24,800 27,200	18 None	5.7 6.2
35	.....do.............	1 mile east of junction of Chilesburg and Athens-Boonsboro Pike.	0–7 7–18	2,832 1,316	2,080 2,240	24,600 24,200	108 900	5.5 5.6
19	Salvisa silty clay loam.	Near Athens-Boonsboro Pike and 1½ miles northwest of Athens.	0–7 7–18	3,560 1,780	5,360 6,800	37,600 40,800	54 36	5.5 5.7
21	Eden silty clay.....	Near Armstrong Mill Pike and 1¼ miles from junction with Tates Creek Pike.	0–7 7–18	4,332 2,084	2,080 2,120	55,400 61,200	None ([4])	5.7 6.8
37	Maury silt loam, imperfectly drained phase.	Experiment station farm near central part of western boundary.	0–7 7–18	3,300 2,114	8,520 11,640	21,400 22,000	36 18	5.9 5.7
8	Culleoka silt loam..	Near Jacks Creek Pike, 1¼ miles from Kentucky River.	0–7 7–18	2,268 1,256	2,520 2,360	33,800 36,200	72 72	5.6 5.8
7	Elk silt loam.......	Near Jacks Creek Pike and Kentucky River.	0–7 7–18	2,204 1,740	1,720 1,700	39,000 41,400	36 36	6.2 5.9
17	Cumberland silt loam.	Near Richmond Pike and Kentucky River.	0–7 7–18	2,164 1,132	7,800 8,200	27,200 27,400	18 None	5.7 5.6
22	Huntington silt loam.	Near Bryan Station Pike, ¼ mile northeast of junction with Briar Hill Pike.	0–7 7–18	4,188 2,024	11,040 11,880	31,600 31,800	None 18	5.9 5.5

[4] Slightly alkaline.

The analyses of the 13 samples of surface soil of Maury silt loam show a nitrogen range from 2,752 pounds to 4,632 pounds, and an average of 3,341 pounds an acre. These results show that Maury silt loam in Fayette County is fairly well supplied with nitrogen. The phosphorus content of the samples of surface soil ranges from 2,400 pounds to 21,560 pounds, and the average is 7,986 pounds an acre. This soil was formed from the disintegrated limestone containing phosphatic strata, and in some places a phosphatic residue ranging from 1 to 3 feet in thickness, lying just above the rock, contains tri-

calcium phosphate offering possibilities of commercial development. The potassium content of the surface soil is rather uniform, and the average of approximately 26,000 pounds an acre is an ample supply for the production of good crops of white burley tobacco which requires rather large quantities of potassium for its growth.

The nitrogen content of the subsurface-soil samples is about one-half that of the surface-soil samples, whereas phosphorus and potassium increase slightly in the subsurface soil.

The analyses of the surface-soil and subsurface-soil samples from Mercer silt loam show considerably less nitrogen and phosphorus than those from Maury silt loam, but the potassium content is about the same.

Four samples of the surface soil and subsurface soil were collected from Hagerstown silt loam. The average for the nitrogen content is considerably more than in either Maury silt loam or Mercer silt loam. The average for phosphorus is more than in Mercer silt loam but less than in Maury silt loam. The potassium content is about the same as in the soils mentioned.

In the rest of the soils, which are of small total area, the nitrogen content is approximately 2,500 pounds an acre, phosphorus about 4,000 pounds, and potassium about 30,000 pounds.

The one sample of Eden silty clay analyzed is well supplied with nitrogen, is moderately low in phosphorus, and contains nearly twice as much potassium as any other soil in the county. The Eden soil is regarded the least productive soil in the county. However, experiments might reveal that this soil is well adapted to special crops which can utilize slowly available potassium. The soil reaction of the surface-soil and subsurface-soil samples range from pH 5.3 to pH 6.6, and the average would be about pH 6.

A summary of the foregoing results shows that 17 of the 34 samples of surface soil analyzed were amply supplied with nitrogen (3,000 pounds an acre), and that practically all the samples contained as much as 2,000 pounds. Only 3 samples showed less than 2,000 pounds of phosphorus an acre and none less than 20,000 pounds of potassium.

Soil samples extending to the full depth of the solum of the four principal soils of Fayette County were collected by the field men, air-dried, ground, and submitted to the department of chemistry, Kentucky Agricultural Experiment Station, for silicate analysis. The methods of analysis used were, for the most part, those described by W. O. Robinson of the Bureau of Chemistry and Soils, United States Department of Agriculture.[8] However, for two samples (nos. 99942 and 99961) which were high in phosphorus, a different procedure was used.[9] The results of these analyses are given in table 6.

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[8] Robinson, W. O. METHOD AND PROCEDURE OF SOIL ANALYSIS USED IN THE DIVISION OF SOIL CHEMISTRY AND PHYSICS. U. S. Dept. Agr. Circ. 139, 20 pp. 1930.

[9] The change in the usual silicate-analysis procedure consisted in digesting a part of the highly phosphatic soil in hydrochloric and nitric acids, separation by evaporation of the acid-soluble silica and adding it to the residue insoluble in acids and fusing this with sodium and potassium carbonates in a platinum crucible. Hydrochloric acid was added to the fused mass until the alkali silicates were decomposed. The solution was evaporated to dryness and baked on a sand bath until all odor of hydrochloric acid was expelled. The residue was cooled and digested with 1–1 hydrochloric acid on a hot-water bath, the silica filtered out, washed, ignited, and weighed in the usual way. The filtrates from the silica were mixed, made to a definite volume, and aliquots taken for iron and aluminum, phosphorus, calcium, and magnesium. Iron and aluminum were determined by the Gladding method for phosphate rock, calcium and magnesium by the McCrudden method, and phosphorus as magnesium pyrophosphate by the Molybdate method.

TABLE 6.—*Chemical analyses of 4 soils from Fayette County,*

MAURY SILT LOAM [1]

Sample no.	Description	Depth	SiO_2	TiO_2	Fe_2O_3	Al_2O_3	MnO	CaO	MgO	K_2O	Na_2O	P_2
		Inches	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*P*
99933	Reddish-brown silt loam	0– 7	72.90	1.23	4.24	9.48	0.53	0.75	1.46	1.38	0.33	0.
99934	do	7– 17	73.29	1.28	4.68	11.52	.48	.68	1.07	1.41	.44	.
99935	Reddish-brown silty clay loam containing iron and manganese pellets	17– 34	65.00	1.41	7.27	16.58	.53	.73	1.55	1.10	.05	.
99936	do	34– 66	57.52	1.15	8.94	18.61	.72	.86	1.37	.91	.10	1.
99937	Dark chocolate-brown clay loam	66– 72	37.32	.94	10.62	20.27	1.25	10.10	.86	.96	.11	11.
99938	do	72– 86	38.84	.89	10.34	20.34	.91	9.92	1.44	1.41	.16	10.
99939	Parent material of dark-brown plastic clay	86–104	41.04	.99	10.01	19.27	1.07	9.69	1.42	2.36	.17	9.
99940-a	Dark chocolate-brown silty clay	104–130	29.14	.52	8.50	16.86	.99	18.61	1.12	1.44	.24	15.
99941-b	do	104–130	36.02	.83	9.09	16.58	.91	14.05	1.24	1.75	.18	12.
99942	Dark-brown silty clay material over bedrock	130–144	15.42	.31	5.11	9.44	1.36	29.56	.95	.89	.14	24.

MERCER SILT LOAM

Sample no.	Description	Depth	SiO_2	TiO_2	Fe_2O_3	Al_2O_3	MnO	CaO	MgO	K_2O	Na_2O	P_2
99943	Grayish-brown silt loam	0– 7	78.44	1.47	4.26	7.71	0.22	0.55	0.74	1.08	0.30	0.
99944	Rust-brown silt loam with yellow-gray splotches	7– 20	73.05	1.44	6.51	12.75	.02	.58	1.12	1.19	.17	.
99945	Loose brown silt loam	20– 36	68.42	1.56	7.83	15.22	.01	.53	1.35	1.17	.19	.
99946	Rust-brown and yellow silt loam	36– 54	57.75	1.32	8.50	21.17	.01	.63	1.85	1.90	.25	.
99947	Bluish-gray and pale-yellow very plastic clay	54– 76	57.45	1.10	7.20	22.38	.01	.88	2.00	2.89	.29	.
99948	Rust-brown clay with gray splotches	76– 86	56.85	1.07	5.76	19.96	.08	1.17	2.66	2.82	.49	.
99949	Blue, yellow, and brown gritty clay	86– 96	53.92	1.05	9.11	20.72	.08	1.54	2.36	2.66	.40	.
99950	Alkaline yellow clay, with small blue and dark-brown splotches, over bedrock	96–116	54.31	1.09	7.84	19.64	.04	3.19	2.29	3.01	.35	.

[1] This soil is well drained and is acid to a depth within a few inches of bedrock.
[2] Fluorine determined by W. R. Roy, chemist, Kentucky Agricultural Experiment Station.

TABLE 6.—*Chemical analyses of 4 soils from Fayette County, Ky.*—

HAGERSTOWN SILT LOAM

Sample no.	Description	Depth	SiO_2	TiO_2	Fe_2O_3	Al_2O_3	MnO	CaO	MgO	K_2O	Na_2O
		Inches	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
99951	Grayish-brown silt loam with mealy structure	0- 7	73.47	1.23	4.26	9.38	0.16	0.67	0.82	1.16	0.24
99952	Brown silt loam	7- 14	74.85	1.38	4.72	11.61	.17	.52	.89	1.17	.18
99953	Brown heavy silt loam	14- 22	69.72	1.44	6.26	12.12	.39	.65	1.45	1.16	.33
99954	Reddish-brown silt loam with mealy structure	22- 50	57.91	1.40	13.57	13.41	.81	.53	.90	.92	.13
99955	Brick-red color. Iron and manganese material	50- 82	49.59	1.50	25.23	12.45	1.11	.53	.77	.77	.18
99956	Yellowish-gray material with brownish-red and black splotches	82- 96	48.56	1.55	26.06	11.84	.38	.50	.95	.92	.16
99957	Gray silty clay	96-102	60.35	1.65	12.98	13.29	.35	.56	.86	1.18	.21
99958	Yellow silty clay	102-128	57.15	1.34	9.84	20.38	.14	.59	1.90	3.02	.24
99959	Silty clay loam with brown and black splotches	128-139	47.24	1.19	10.36	17.97	.22	5.63	1.65	2.46	.21
99960	Brown gritty silty clay	139-146	31.49	.62	9.90	17.44	.64	18.00	1.18	1.61	.21
99961	Brown sandy clay loam	146-192	25.39	.51	7.60	7.66	.47	24.75	1.70	1.00	.29

LORADALE SILT LOAM

Sample no.	Description	Depth	SiO_2	TiO_2	Fe_2O_3	Al_2O_3	MnO	CaO	MgO	K_2O	Na_2O
99962	Brown silt loam	0- 7	74.57	1.43	5.33	9.70	0.38	0.76	0.94	1.12	0.15
99963	Yellowish-brown silt loam	7- 17	74.34	1.43	4.56	10.56	.11	.64	1.23	1.47	.44
99964	Yellowish-brown heavy silt loam	17- 26	69.55	1.39	6.34	12.91	.26	.65	1.20	1.50	.40
99965	Brown silty clay loam	26- 36	62.66	1.60	10.02	16.35	.45	.62	1.33	1.34	.22
99966	Loose granular brown clay loam	36- 48	51.64	1.31	13.30	21.38	.12	.66	1.64	1.99	.18
99967	Rust-brown silty clay	48- 84	48.69	1.11	14.99	21.74	.08	.63	1.67	2.57	.34
99968	Brown silty clay	84-114	52.48	1.14	12.40	20.27	.19	.62	2.12	3.18	.24
99969	Grayish-blue material	114-168	55.59	1.14	9.85	19.85	.20	1.15	2.19	3.83	.26
99970	Brown weathered shale	168-182	55.53	1.08	8.73	19.66	.21	1.42	2.55	4.70	.19

The analyses show that in Maury silt loam the silica content diminishes gradually as depth increases. The results for aluminum show a gradual increase with depth in the upper half of the profile and a corresponding diminution in the lower half. The iron content closely parallels the aluminum content and is largest midway of the profile. The results for titanium are somewhat irregular but on the whole show a decline as depth increases. The results for phosphorus show a gradual increase to a depth of 66 inches, but at this depth there is a phosphatic layer, and the phosphorus content increases irregularly with depth until bedrock is reached. The lower 14 inches of the material contain approximately 500,000 pounds of phosphorus an acre. The high phosphorus content of the lower 72 inches of the soil material is probably more or less typical for any samples that might be taken in Maury silt loam, although the thickness and the phosphorus content may be subject to considerable fluctuation in different areas. The results of the analyses show that the content of manganese differs somewhat at different depths. The largest amount was found in the phosphatic layer at the lowest depth. The calcium content conforms very closely with the phosphorus content, indicating that most of the phosphorus is in the form of tricalcium phosphate. The magnesium content is small and does not show any relation to the phosphorus content. The largest amount of potassium is in the layer between 86 and 104 inches, and it is more than twice the amount in 4 other layers in this profile.

The analyses of the first and second samples are almost identical and, on a chemical basis, do not afford much evidence of stratification. Except for the silica content, the third and fourth samples are very much the same. Chemically, the fifth and sixth samples are practically identical and offer very little evidence of two distinct layers. The remaining four samples show considerable differences in their silica, iron, aluminum, calcium, and phosphorus contents. This lends support for the separation into layers, which was made on physical differences in the soil materials. The nitrogen content shows a gradual diminution with increase in depth. The sulphur content is largest in the surface layer and the bottom layer.

The silica content of the samples of Mercer silt loam diminishes gradually as depth increases, whereas there is a tendency for the aluminum and iron to increase. The results for calcium, magnesium, and potassium show appreciable increases in the lower layers of the profile. The results for nitrogen and sulphur diminish uniformly with depth. The analyses do not indicate two layers in the section between 36 and 76 inches, as the results are practically identical. The chemical composition of the samples does not lend much support for the layer divisions that were made on the basis of the physical characteristics.

From an inspection of the analyses of samples of Hagerstown silt loam it is noted that this soil is somewhat similar in chemical compositon to Maury silt loam. The silica content decreases as depth increases, until the percentage in the bottom layer is about one-third of that in the surface layer. The aluminum content increases slightly in the lower layers, and the iron content increases rapidly from the surface to the middle of the profile, beyond which it decreases until it is about the same in the bottom layer as in the surface layer. The

layers between 66 and 104 inches contain considerably more iron than any other layer in any of the Fayette County soils analyzed.

The phosphorus content of the Hagerstown soil is somewhat similar to that of Maury silt loam, although the thickness of the phosphatic layer is considerably less and the phosphorus content of the samples from it is also less than in the Maury soil. The calcium content is equivalent to the phosphorus content to form tricalcium phosphate as in Maury silt loam. The potassium content is greatest in the layer between 102 and 128 inches. The percentages of the other constituents of the two samples of this layer are very similar. The potassium and the iron layers are outstanding characteristics of this soil, as are the calcium and phosphorus layers. The nitrogen diminishes gradually with increase in depth. The sulphur content is irregular throughout the profile.

The silica content of Loradale silt loam diminishes for the first 7 feet and then increases slightly for the next 8 feet. At this point soft shale was reached, and the sampling was discontinued. The aluminum content increases slightly through the first 7 feet and remains nearly constant through the next 8 feet. The iron content rises and falls in the same way as the aluminum content. The titanium content is appreciably higher in the upper third of the profile than in the lower two-thirds, and the phosphorus content increases slightly in the lower two-thirds. This soil is characterized by a low manganese content, especially in the lower layers. Calcium, magnesium, and potassium show perceptible increases in the lower parts of the profile. The analysis ends with a potassium-bearing shale which contains a little more than four times as much potassium as the surface layer. The nitrogen content shows a gradual diminution from the surface layer to the bottom of the profile, and the sulphur content is about twice as much in the upper half as in the lower half.

SOILS AND THEIR INTERPRETATION

Fayette County is near the southwestern edge of the region of Gray-Brown Podzolic soils of the United States, where the climate is normally of a humid temperate type. The average annual rainfall of 43.45 inches is rather uniformly distributed throughout the year.

The original vegetal cover consisted of an open type of hardwood forest composed of trees similar to those of the surrounding oak-hickory hardwoods forest region. The small open areas were occupied by a mixed vegetation consisting chiefly of wild prairie grasses, broomsedge, and cane, which were locally termed "canebrakes."

The soils have developed largely from residual materials which have accumulated in place as a result of chemical decomposition and physical disintegration of massive white limestones, shattered thin-bedded limestones, and a few small areas of interbedded thin limestones and calcareous shales. The distribution of these materials or geological formations within the county is not determined entirely by simple dissection of horizontal rock strata, but in part by geological faults that traverse the county.

The development of the soils in this county, as in most of central Kentucky, has been interfered with by dissection and erosion since the late geological uplift of Kentucky. Fayette County lies only a few miles northeast of the Jessamine Dome which is considered the point of maximum uplift. Since this uplift, a new erosion cycle

has been operating rather vigorously throughout the entire county, and the amount of dissection and erosion which has occurred has been the determining factor in the formation of the present surface relief. The drainage system may be termed dendritic in pattern. All the streams are flowing on bedrock and are at present grading their channels.

The degree to which the soils have developed or matured has been controlled to a large extent by the time the soil-forming material has remained in place. Throughout the county where the valley slopes or hillsides are rather steep, the loss of soil material through erosion is going on as rapidly or more rapidly than new soil is being formed, but on the ridge tops or drainage divides the soils have developed definite profiles with distinct A, B, and C horizons. On some of the more flat uplands there has been insufficient erosion to allow the normal renewal of soil material through gradual deepening. In such places the surface soil is more thoroughly leached and less fertile than that on somewhat more sloping land.

Studies of cross sections of several ridge divides yield evidence suggesting that some of the soils were developed in part on the old pre-Tertiary base-level plain before the late geological uplift, or at the time when the present streams flowed sluggishly across the old base-level plain at a much higher channel level. Throughout the central part of the county the soil materials are very thick, ranging from 10 to more than 20 feet in thickness. Studies of cross sections of the drainage divide near Lexington show that the ridge divide is from 20 to 30 feet higher than the surrounding uplands. The height of this ridge is not due to underlying limestones or shales that are more resistant to weathering than other limestones of the region, but on this ridge the soil material is thick and the surface of the unweathered rock is about on the level with that of other adjacent uplands that have a depth of soil material ranging from about 4 to 5 feet. An examination of the soils and topographic features of this particular section suggests that Fayette County once was covered with a very thick and fairly level soil mantle, in which the soil-water table stood at a depth of about 6 feet below the surface of the older soils that occupied the pre-Tertiary plains of central Kentucky. The recent geological uplift, together with the recent erosion cycle, has removed practically all of these early soils, and new soils have been developed over the greater part of the county on a lower plain. The deposition of the iron and manganese layer, as it occurs in most of the Hagerstown soils, probably occurred when the soil-water table once stood where the iron-manganese layer has formed.

On the basis of soil characteristics the mature soils have been divided into two main groups. (1) The reddish-brown soils which are soils of medium age, reddish brown throughout the profile, and slightly acid to bedrock, have semiplastic or nonplastic slightly granular subsoils, are well drained and oxidized, occupy rolling to slightly undulating surface relief, and are developed from limestones of rather high purity. This group is dominated by the Maury soils and includes the Hagerstown soils. (2) The grayish-brown and yellowish-brown soils which are soils of early maturity, have plastic subsoils, range from medium to strongly acid throughout the solum, occupy rolling to undulating surface relief, and are developed from

intermixed thin-bedded limestones and shales. The dominant soils of this group are the Mercer and Loradale soils.

In addition to the soils of these two main soil groups is a minor group of dark-brown soils that are rather youthful, have little or no profile development, range from alkaline to slightly acid in reaction, occupy rather steep to rolling surface relief, and are subject to considerable erosion when cultivated.

The reddish-brown soils, all of which are brown, reddish brown, or rich chocolate brown, occupy an area of approximately 2,400 square miles. which includes all or parts of Fayette, Scott, Woodford, Jessamine, Mercer, Boyle, Garrard, Anderson, and Franklin Counties. Fayette County contains 184.2 square miles of the reddish-brown soils, most of which are in the western half. All these soils are well drained and well oxidized, have semiplastic or nonplastic silty clay loam or clay loam subsoils which are easily penetrated by roots and water, and are developed from limestone materials.

This group of soils has been subdivided into two main soil series, on the bases of profile characteristics and parent materials—the Maury and Hagerstown. The principal differences between the soils of the two series are the phosphorus content of the parent materials and slight differences in soil color. The Maury soils are much higher in phosphorus content, and the color of the surface soil and subsoil is richer mahogany brown.

The Maury soils occur in two main bodies, the soils in both of which are developed from similar parent materials and have practically the same drainage conditions. The Lexington limestone which underlies these two areas of Maury soils is of high purity and contains a relatively high percentage of tricalcium phosphate $[Ca_3(PO_4)_2]$.

The generalized profile of Maury silt loam consists of an eluviated A horizon which is a layer of rich reddish-brown mellow or fluffy silt loam, ranging from 10 to 20 inches in thickness, below which is the illuviated B horizon continuing downward to the parent material. The thickness of the parent material at different locations differs considerably. On ridge tops the parent material may be reached at a depth ranging from 40 to 60 inches. In some places the B horizon extends to bedrock. The B horizon typically is slightly granular, incoherent, semiplastic or nonplastic silty clay loam or silty clay. All the Maury soils are exceptionally well drained and well oxidized to bedrock. They occupy areas of comparatively smooth to rolling relief, which are dissected by many drainage channels.

Following is a description of a profile of Maury silt loam, as observed on a bluegrass-sodded ridge top on the United States Narcotic Farm:

1. 0 to 7 inches, rich reddish-brown fluffy silt loam containing light reddish-brown splotches. The insides of the soil granules contain less organic matter than the outsides which are stained with a dark organic coating. The structure is mealy or very fine granular. The granules separate easily under either moist or dry conditions. They have no definite form or cleavage. The surfaces of the granules are peppered with many very thin gray or grayish-white particles that are hardly visible to the naked eye. Many hairlike channels ramify between the soil particles and granules. Wetting the soil darkens the color considerably.

2. 7 to 17 inches, similar to horizon 1, except in color and texture, the color being distinctly more intensive and lighter reddish brown and the texture slightly heavier. The soil particles and soil granules are held together more firmly by compression and increased colloidal content. The surfaces of the granules show fine gray specks. Wetting the soil darkens its color.
3. 17 to 34 inches, reddish-brown compact but very permeable silty clay loam. Wetting this layer does not change the color. The structure is medium coarse granular, the granules being angular. No fine hairlike channels and very few insect holes are present. A few iron and manganese oxide pellets the size of bird shot occur throughout this soil layer. Irregular cleavage lines are definitely established. The surfaces of the soil granules are coated with colloidal films, and when the granules are separated under moist conditions the surfaces are rather shiny. The material in this layer is not sticky or plastic when wet.
4. 34 to 66 inches, coarse-granular adhesive and compacted silty clay loam. Numerous iron and manganese pellets and stains occur between the cleavage lines of the soil granules. A few grayish-white weathered siliceous materials or particles resembling fine sand grains are noticeable. Many subsoil drainage holes or channels the size of pencil lead occur. The material in this layer is not plastic when wet. It falls apart easily when handled under moist conditions.
5. 66 to 72 inches, the transitional layer between 4 and 6. The soil material is dark chocolate brown with streaks of black and yellowish brown. The residues of weathered limestones and soft siliceous chert, which are noneffervescent to acid, are very numerous. Drainage channels from one-sixteenth to one-eighth inch in diameter are numerous. The soil material is less adhesive than that in horizons 3 and 4. Considerable gray fine sharp sandlike material is present, which probably is fossil remains from the decomposition of the parent rock.
6. 72 to 86 inches, very dark chocolate-brown material which seems to be semialtered parent material that has a coarse-granular or nuggetlike structure. The cleavage lines of the granules are filled with appreciable quantities of colloidal material that gives rise to shiny slick surfaces when the granules are separated. The drainage channels are larger than in horizon 5. Large quantities of gray and white fossil materials, resembling very fine sand particles, remain throughout the soil mass. Weathered chert fragments from one-fourth to one-half inch in diameter are present but are not numerous. A few black splotches or streaks occur throughout this material.
7. 86 to 104 inches, dark-brown somewhat plastic gritty silty clay that contains abundant gritty gray material. Pinhead-sized red splotches, together with a few yellowish-brown and black streaks, occur throughout this layer.
8. 104 to 130 inches, dark chocolate-brown structureless silty clay. Gritty gray and white material makes up about 25 percent of the parent materials.
9. 130 to 144 inches, black or very dark brown gritty sandy clay, the grittiness resulting from rock decomposition. 144 inches+, solid beds of Lexington limestone.

The soil is well drained throughout. It is slightly acid to within 3 inches of bedrock.

A gray-brown phase of Maury silt loam occurs in several of the more level areas, where very little if any loss of soil by erosion has taken place, consequently the surface soil has been leached until it is grayish brown. Following is a description of a profile of this more highly leached phase of Maury silt loam occupying a ridge top about 4 miles southwest of Lexington:

1. 0 to 14 inches, grayish-brown loose fluffy silt loam which is rather acid and has a few light-brown splotches. The soil clusters seem to be practically the same color throughout.
2. 14 to 20 inches, brown silt loam with many reddish-brown splotches and small black iron and manganese streaks or spots. The texture changes to heavy silt loam, and the structure becomes faintly granular.

3. 20 to 52 inches, material grading from faint yellowish brown into decided reddish brown with increase in depth. A few small iron and manganese pellets the size of a pinhead occur throughout this layer. The soil texture becomes heavier with depth, ranging from silty clay loam to silty clay. The material is rather compact but not plastic, and when moist it breaks easily into coarse angular granules.
4. 52 to 88 inches, a layer transitional from 3 to 5, containing large quantities of iron and manganese pellets and nuggets. The soil material is rather porous silty clay loam stained with large splotches of iron and manganese materials. Some gray weathered chert material is present.
5. 88 to 122 inches, brownish-yellow silty clay with yellowish-brown, blackish-brown, and a few grayish-brown mottlings or splotchings. This is true parent material weathered from limestones.
6. 122 to 135 inches, chocolate-brown or yellowish-brown silty clay containing gray materials (resembling sand) and weathered chert fragments. Large yellow streaks and splotches occur in the lower part of the layer.
7. 135 to 162 inches, very dark chocolate-brown silty clay which contains considerable quantities of rotten weathered chert and gritty material. Some yellow and bluish-yellow streaks and splotches occur in this layer.
8. 162 to 182 inches, a mixture of bluish- or purplish-chocolate-brown and light-yellow clay which is rather brittle and structureless, and feels smooth to the touch. It immediately overlies bedrock.

The Hagerstown soils are developed from soil-forming materials resulting from the decomposition of Cynthiana limestones which are much lower in phosphate content than the Lexington limestones, from which the Maury soils are normally developed. The Hagerstown soils have excellent drainage.

A description of a profile of Hagerstown silt loam, as observed in a forested area with a bluegrass ground cover, occupying a ridge top at the southwestern edge of Lexington, follows:

1. 0 to 7 inches, dark grayish-brown silt loam. The dark color is partly due to a good supply of organic matter. The material when dry becomes grayish brown. It has a mealy structure and is very fluffy and mellow when pulverized.
2. 7 to 14 inches, brown silt loam containing less organic matter than the surface layer; otherwise the soil is similar to that in the layer above. The material in this layer has a pronounced fine granular structure. The surfaces of the granules are rather heavily sprinkled with many very fine white or gray particles. Many very small holes or channels ramify the soil granules to form a vesicular structure.
3. 14 to 22 inches, brown or yellowish-brown heavy silt loam of decidedly angular coarse-granular structure, the granules averaging about one-fourth of an inch in diameter and being very incoherent. Iron and manganese pellets become noticeable in this layer.
4. 22 to 50 inches, the true B horizon having a coarse-granular or nuggetlike structure. The color changes to yellowish brown and reddish brown, with a dull sheen. The red increases with depth. The soil material is very porous; when moist it crumbles easily, and it is not sticky when wet.
5. 50 to 82 inches, the layer in which large accumulations of iron and manganese sesquioxides have been deposited. Large pieces of these materials, brick red in color, dominate this layer. From 50 to 60 inches the soil is brick red. The iron concretions are black on the outside, yellow on the inside, and have concentric rings. The pieces of iron and manganese materials are rather hard. They range in size from small pellets to pieces 2 inches in diameter as depth increases. Between depths of 60 and 70 inches the iron and manganese materials are formed into large chunks ranging from 1 to 8 inches in diameter. They are rather hard and are yellow on the inside. They comprise

about 75 percent of the materials in this layer. Between 70 and 82 inches the pieces of iron and manganese materials become smaller and softer, and they are either coal black or yellowish brown.

6. 82 to 96 inches, a transitional layer, in which the color gradually changes from brick red to yellow, and the iron and manganese materials change to black soft splotches. The material is porous and very loosely held together.
7. 96 to 102 inches, black, yellow, and gray splotched material, the black being on the outsides of the soil aggregates. The texture is silty clay or clay.
8. 102 to 110 inches, yellow velvety silty clay with a few brown and gray spots and splotchings. The material is smooth, slick, and brittle, but it is not plastic or even sticky when wet. It resembles weathered shale.
9. 110 to 139 inches, brown and yellow mixed gritty silty clay material containing a few black spots.
10. 139 to 146 inches, brown gritty clay or silty clay containing a few small black and yellow splotches.
11. 146 to 192 inches, brown and yellowish-brown very gritty, almost sandy, parent material which resembles coarse sandy clay.

The depth to rock is not known but is estimated to be about 20 feet.

The Loradale soils occupy a position intermediate between the Hagerstown and Mercer soils so far as soil characteristics are concerned. Following is a description of a profile of Loradale silt loam, as observed about 3 miles east of Montrose at an angle in the road near the schoolhouse. The vegetal cover is a mixed bluegrass and wild-grass sod. This soil has not been cultivated for more than 15 years.

1. 0 to 7 inches, loose, friable, mellow, and very fine granular brown silt loam. The soil granules have a gray sprinkling over their surfaces.
2. 7 to 17 inches, slightly yellowish brown fine-granular silt loam. The granules are loosely held together and their surfaces are sprinkled with a very fine powdery gray material. Many very small hairlike holes completely ramify this soil layer.
3. 17 to 26 inches, yellowish-brown heavy silt loam with traces of small specks of iron and manganese stains appearing throughout. The soil is faintly granular and has a loosely held together crummy structure. The material crumbles very easily when moist.
4. 26 to 36 inches, brown silty clay loam with grayish-brown streaks infiltrated into the cleavage lines. This material crumbles very easily when moist and seems to be rather rotten in consistence. It shows little or no structure.
5. 36 to 48 inches, a layer of loose granular yellowish-brown silty clay. A few black stains and splotches are noticeable throughout. The material falls apart easily when moist, and the surfaces of the granules, which are about one-eighth of an inch in diameter, are slick and shiny, as they seem to be coated with a colloidal film. The angles of the granules are sharp.
6. 48 to 84 inches, mixed yellow and rust-brown silty clay or clay, that is heavily splotched with black iron and manganese stains. This soil layer has a nuggetlike structure, with the surfaces of the nuggets angular, very smooth, and shiny. The interiors are bluish gray. The soil material in this layer is rather sticky when wet.
7. 84 to 114 inches, splotched yellow, black, and rust-brown silty clay that has a talclike feel. Yellow and yellowish brown dominate the colors, with some grayish blue intermixed. The material is structureless, and when handled under moist conditions the soil mass resembles stiff butter.
8. 114 to 168 inches, similar material to that in layer 7, except that the rust-brown color disappears, and the dominant colors are black, yellow, and grayish blue. The black color is caused by iron and manganese stains and splotches. The material is brittle, talclike, and breaks into aggregates about 1 inch in diameter.

9. 168 to 182 inches, brownish-blue and yellow brittle clay that resembles weathered shale.
10. 182 inches +, possibly shale and limestone. The depth to rock is undetermined.

The grayish-brown and yellowish-brown soils are included chiefly in the Mercer series. They occupy land of gently rolling or undulating relief which has not been entirely invaded by erosion and dissection since the late geological uplift of the land. They seem to be among the oldest soils in the county, as they have been subjected to a long period of rather severe leaching. They are well drained, and no ground-water table exists in the solum except during very wet seasons.

In general these soils have a loose nongranular mellow silt loam surface soil, or eluviated horizon, which is well leached and strongly acid. Immediately under the eluviated horizon is the illuviated horizon which is grayish-brown or yellowish-brown faintly mottled material forming a transitional zone that appears to have been a typical B horizon in the past but is now being eluviated and developed into the lower part of the A horizon. The middle and lower parts of the illuviated horizon are now heavy brownish-yellow silty clay highly mottled with bluish-gray, gray, yellow, rust-brown, and black splotches and specks. The extreme lower part of this horizon is bluish-brown or yellowish-brown clay which is very plastic when wet and very hard when dry. The parent materials are shattered thin-bedded limestones and calcareous shales.

Following is a description of a profile of Mercer silt loam, as observed on a ridge top in a bluegrass pasture, about 3 miles northwest of Athens:

1. 0 to 7 inches, dull yellowish-brown or grayish-brown nongranular fluffy silt loam.
2. 7 to 20 inches, rust-yellow or rust-brown splotched heavy silt loam. Iron and manganese pellets the size of coarse shot are numerous. Granulation is faintly developed, and the soil aggregates are loosely held together.
3. 20 to 36 inches, yellowish-brown very incoherent loose silt or silt loam having a somewhat single grain structure. The soil material when handled falls apart very easily, and it is nonplastic when wet.
4. 36 to 54 inches, rust-brown, brownish-yellow, and bluish-gray very plastic puttylike clay. The material when dry is hard and breaks into large clods or lumps.
5. 54 to 76 inches, light-blue or purplish-blue and pale-yellow tough plastic clay. The colors are intermixed but not blended or splotched.
6. 76 to 86 inches, blue, gray, and rust-brown clay which contains large black splotches of iron and manganese sesquioxides.
7. 86 to 96 inches, blue, yellow, and brown gritty clay resembling decomposed shale and small fragments of limestone.
8. 96 to 116 inches, yellow clay that is very brittle and has a soapy feel. It contains a few small deep-blue and dark-brown splotches.
9. 116 inches +, limestone rock and calcareous shale.

Table 7 gives the results of pH determinations of four soils. These determinations were made by E. H. Bailey in the laboratories of the Bureau of Chemistry and Soils by the hydrogen-electrode method.

TABLE 7.—*pH determinations of four soils from Fayette County, Ky.*

Soil type and sample no.	Depth	pH	Soil type and sample no.	Depth	pH
Maury silt loam:	*Inches*		Loradale silt loam:	*Inches*	
391601	0– 8	5.8	391663	0– 8	5.8
391602	8– 17	6.3	391664	8– 17	5.8
391603	17– 34	6.3	391665	17– 26	5.9
391604	34– 66	5.7	391666	26– 36	5.3
391605	66– 72	5.5	391667	36– 48	5.3
391606	72– 86	5.6	391668	48– 84	5.5
391607	86–104	5.7	391669	84–114	5.3
391608	104–130	5.8	391670	114–168	5.8
391609	130–144	6.2	391671	168–182	7.4
Hagerstown silt loam:			Mercer silt loam:		
391653	0– 10	5.7	391672	0– 7	5.3
391654	10– 32	6.1	391673	7– 20	5.1
391655	32– 36	6.6	391674	20– 36	5.2
391656	36– 66	5.8	391675	36– 54	5.1
391657	66– 88	5.2	391676	54– 76	4.9
391658	88–102	5.3	391677	76– 86	6.3
391659	102–118+	5.3	391678	86– 96	7.1
			391679	96–116	8.2

Table 8 gives the results of mechanical analyses of samples of four soils. These analyses were made in the laboratories of the Bureau of Chemistry and Soils.

TABLE 8.—*Mechanical analyses of four soils from Fayette County, Ky.*

Soil type and sample no.	Depth	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
Maury silt loam:	*Inches*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
391601	0– 8	1.2	2.7	1.0	0.6	0.5	56.2	37.9
391602	8– 17	.7	2.8	1.3	.7	.5	58.8	35.3
391603	17– 34	.9	3.1	1.4	1.1	.8	38.6	54.2
391604	34– 66	1.7	3.1	1.0	.9	.8	30.4	62.2
391605	66– 72	1.3	2.7	1.6	2.8	2.8	21.5	67.2
391606	72– 86	1.2	3.6	3.0	6.1	6.1	24.6	55.4
391607	86–104	.2	.9	1.1	4.1	5.3	20.0	68.3
391608	104–130	.2	1.4	2.8	6.7	6.0	23.3	59.7
391609	130–144	1.8	4.3	4.5	11.6	7.4	18.4	52.0
Hagerstown silt loam:								
391653	0– 10	1.6	3.2	1.0	.6	.5	56.6	36.5
391654	10– 32	1.8	3.0	1.0	.7	.5	53.6	39.4
391655	32– 36	2.9	4.1	1.2	.9	.6	43.9	46.4
391656	36– 66	3.2	4.7	1.5	1.2	.9	37.1	51.5
391657	66– 88	2.9	4.9	1.6	1.3	1.1	38.1	50.2
391658	88–102	4.7	4.9	1.6	1.6	1.6	36.6	49.0
391659	102–118+	.3	.7	.7	1.6	1.9	19.0	75.8
Loradale silt loam:								
391663	0– 8	2.4	4.4	1.6	1.2	1.0	59.6	29.7
391664	8– 17	1.1	3.5	1.5	.9	.6	55.5	37.0
391665	17– 26	1.5	3.2	1.4	1.1	.7	50.0	42.1
391666	26– 36	3.8	4.2	1.7	1.5	1.2	38.0	49.7
391667	36– 48	.5	1.7	1.4	2.2	2.1	22.2	70.0
391668	48– 84	.0	1.3	1.9	3.2	2.6	21.6	69.5
391669	84–114	.1	.8	1.1	2.2	2.0	25.8	68.0
391670	114–168	.1	.6	.7	1.6	1.7	32.6	62.8
391671	168–182	.0	.1	.1	.5	.9	32.3	66.2
Mercer silt loam:								
391672	0– 7	2.0	2.9	1.1	.6	.7	57.0	35.8
391673	7– 20	.7	1.6	.8	.5	.6	50.8	45.1
391674	20– 36	1.3	2.2	.6	.4	.7	49.0	45.7
391675	36– 54	.8	.8	.3	.4	.7	24.8	72.3
391676	54– 76	.0	.1	.1	.5	1.5	32.9	65.0
391677	76– 86	.1	.1	.1	.4	.9	31.0	67.4
391678	86– 96	.1	.1	.3	.8	1.7	22.5	74.6
391679	96–116	.2	.1	.2	.5	1.4	31.5	66.1

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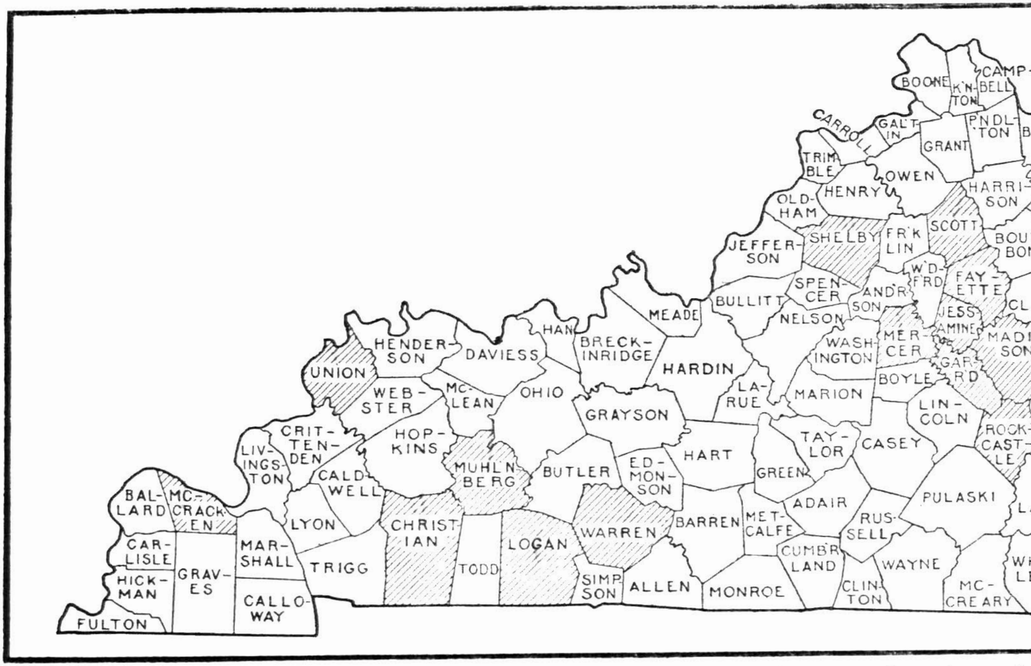

Areas surveyed in Kentucky, shown by shading. Detailed surveys shown by north

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SOIL MAP
FAYETTE COUNTY
KENTUCKY

KENTUCKY AGRICULTURAL EXPERIMENT STATION
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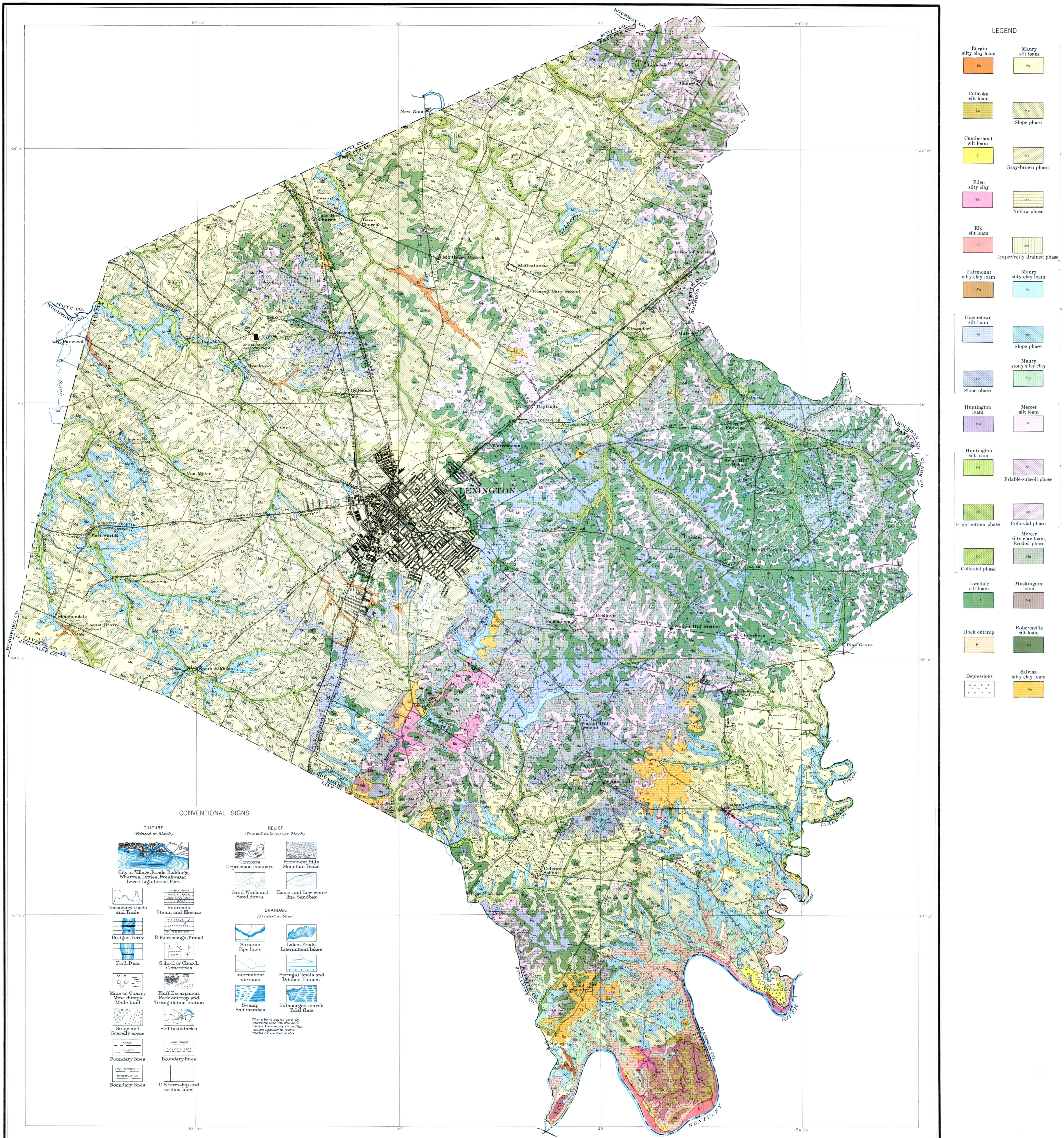

Mark Baldwin, Inspector, District 1.
Soils surveyed by Howard Wm. Higbee, U. S. Department of Agriculture, in charge, and K. S. Venable, Kentucky Agricultural Experiment Station.

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